A HANDBOOK FOR MIDWIVES AND MATERNITY NURSES

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AND

MATERNITY NURSES

BY

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PART I

THE CHIEF DUTY OF MIDWIVES AND MATERNITY NURSES

Though labour is a perfectly natural process, still a very large number of women die in or soon after child-birth.

The causes of this loss of life are mainly of two kinds.

First is the form of blood-poisoning known as child-bed fever, puerperal fever, or puerperal septicæmia. Fully half the deaths that occur in connection with child-birth are due to this cause.

Second are various troubles which arise in connection with labour itself, such as loss of blood, rupture of the womb, convulsions, or heart failure. These may be classed together as the accidents or complications of labour.

The first duty of midwives and nurses is to protect their patients from the risk of puerperal fever, for every woman at every confinement is exposed to the risk of losing her life through blood-poisoning.

The complications or accidents of labour are rare. It is only a few women in a hundred whose lives are endangered by them. The art of midwifery provides means by which most of these troubles can be prevented from having serious results. Thus the second duty of midwives and nurses is to recognise quickly the danger signals which give warning of coming complications, and to secure medical assistance, so that each error may be corrected before much harm is done.

A third duty of all who attend upon women in labour is to relieve the suffering of their patients, so far as is possible, without endangering the life or health of mother or child. But safety is more important than comfort, and

it must be repeated that the chief duty is the prevention of infection, because this, the greatest risk, has to be met in every case without exception.

Everyone who reads now knows that a great many diseases are caused by those smallest living things which are known as germs, micro-organisms, or bacteria. It is a matter of common knowledge that certain kinds or species of micro-organisms live upon dead animal or vegetable substances and bring about their decay, decomposition, or putrefaction, while other organisms cause inflammation and suppuration in wounds.

A clean cut wound should heal without becoming red, hot, or painful, that is to say without becoming inflamed, and without the discharge of any "matter" or *pus* as it is called. When a wound festers and suppurates, it is because some common micro-organisms or germs have entered the wound and infected it. The smallest wound, if once infected, may cause blood-poisoning (septicæmia) so severe as to cause death. In former times soldiers slightly wounded in war used to die by hundreds owing to their wounds becoming infected. Also in hospitals the wounds of surgical operations used to suppurate, so that the patients died in great numbers of what was called surgical fever.

Puerperal or child-bed fever is the same thing as surgical or wound fever. It is due to the entrance of common organisms or bacteria into the cavity of the womb, or into any torn or bruised part of the birth passage.

Puerperal fever can therefore be prevented by the same methods which are used in surgery to prevent the inflammation and suppuration of wounds. The object is to prevent the entrance of micro-organisms into the birth canal during or after labour.

The difficulty in securing this object is due to the fact

that these micro-organisms are so small that they cannot be seen, and so numerous that our own persons, our clothes, and all domestic articles are practically covered with them. They abound in every particle of dust, and in all but the cleanest of water. They live in the pores of our skin, in our hair, under our finger nails, everywhere.

It is thus clear that unless special precautions are taken, anything that so much as touches the external organs of reproduction may convey infection to the patient. The finger with which an examination is made, any instrument which is used, even the water with which she is washed may introduce germs to the passages, and once there they multiply so rapidly that in a few hours their presence is made known by symptoms of fever. In other words, all common objects are *septic*, and may convey septic infection. Before use they must be made sterile, or *aseptic*, or germ-free. Means must be used to kill all the micro-organisms which are on the hands and instruments, on articles of clothing, in the water with which the parts are washed, on the articles with which the washing is done, and in fact on everything which can touch the patient's genital organs.

This is known as disinfection or sterilisation, and there are various means by which it can be done.

Thus various chemical substances, called antiseptics or disinfectants, can poison micro-organisms which are exposed for some time to their action. Heat, if sufficiently great and sufficiently prolonged, also kills them ; moist heat can be applied by boiling articles, or by steaming them ; while dry heat is applied by placing the articles to be disinfected in an oven or stove, or by passing them through a flame.

The skin of the hands and the skin of the patient cannot be boiled, steamed, or stoved, so that chemical

disinfectants dissolved in water must be used for killing micro-organisms in the skin.

Water can be sterilised by boiling it for half an hour. Instruments of all kinds can also be boiled for a similar time, and so can clothes, towels, aprons, washing dresses, and the like.

It is one thing to be clean in the ordinary sense, and quite another to be clean in the surgical sense. Hands that have been washed in soap and water are called clean, but they are not free from germs, or *aseptic*. To render them aseptic they must be soaked in an antiseptic lotion. In the same way a steel instrument taken out of the pocket is clean enough in the ordinary sense, but it is covered with micro-organisms. After boiling it for half an hour all the micro-organisms on it are dead, and it is then aseptic or surgically clean. The object to be secured in midwifery is that everything which touches the patient's genitals shall be aseptic. This is what is meant by the aseptic method in obstetric practice.

In the prevention of puerperal fever or septic infection, other considerations must be remembered besides the mere prevention of the entrance of germs into the birth passage. Women whose health is in a low state suffer from the effects of infection more easily than others. The effect of living in a house in which the drains are defective or the sanitary arrangements are in any way bad, is to alter the health in such a way that infective disease is more frequent and more serious. Thus the choice of a lying-in room and the sanitation of the patient's house are matters which demand care. Again, loss of blood during labour, and the exhaustion caused by unduly prolonged labour, make women who suffer from them more liable to suffer from infection. So that the ending of labour at a proper time is one of the means of preventing puerperal fever. This

is an additional reason why help should be secured for a patient before she has been allowed to become exhausted, and why blood loss should be prevented by all the means at the disposal of the attendant. These points will receive further attention later.

For those engaged in the management of labour and the care of lying-in women, personal cleanliness is of the utmost importance. It is clear that a midwife or nurse is a source of danger to her patients unless she herself is personally clean. For this reason she should take hot baths very frequently, and when possible should have an extra one before going to a case. Her hair should receive special attention and should be washed often. Her clothes should all be washable, and should be made so that the sleeves can easily be rolled well above the elbow. A freshly washed apron should always be worn in order that things which touch it may not be infected. In order that the hands may be easily sterilised, they should be kept soft and smooth by avoiding work which will make the skin coarse and rough. If they become rough and sore through the constant use of antiseptic lotions, lanoline or vaseline should be rubbed into them at night and kid gloves should be worn. No one is in a fit state to attend confinements if she has any boil, abscess, or discharging sore or ulcer on her own person.

After attending or visiting any case of fever, or any case in which the patient has any offensive discharge, special precautions must be taken before another case is attended. A complete bath should be taken, all the clothes should be changed, and the hands should be scrubbed and disinfected even more carefully than usual. If at all possible, a few days should be allowed to pass after attending an infected patient before going to another case.

OBSTETRIC ANATOMY

The Abdomen and its Cavity

The word *abdomen* means the lower part of the front of the body ; that part, in fact, which, in speaking of a cow or a horse, is called the belly.

The abdomen contains the largest hollow or cavity in the body, namely the *abdominal cavity.* When a woman is with child, the womb grows upward and fills a large portion of this cavity, pushing aside the other organs which it contains, and lying against the front wall of the abdomen, through which the child can be easily felt.

The shape, extent and walls of the abdominal cavity therefore demand attention.

The ribs, being attached to the spine behind and to the breastbone in front, form a strong bony wall for the upper part of the body. The heart, the lungs and the other organs contained in the chest are shut off from the rest of the body cavity by an arched wall of muscle called the *diaphragm.* This muscular dome forms the roof of the abdominal cavity ; under it lie the liver, the stomach, the kidneys, the coiled bowels or intestines, and many other organs of the body.

The lower part of the spine has a set of bones attached to it which form a ring or girdle round the lower part of the body. This ring of bones is called the *pelvis.* The legs are attached to it at the hip-joints, so that it carries the weight of the body to the lower limbs during standing and walking. The bony pelvis also forms a strong wall for the lower part of the body and protects the organs

contained within it. The lowest part of the abdominal cavity is thus a narrow, basin-shaped space protected by the pelvic bones and called the pelvic cavity. The womb and the other organs of reproduction lie within the pelvis, except when a child is being carried. When the womb contains a growing child, there is no longer room for it in the pelvis. Thus it rises above the ring of pelvic bones and comes to occupy part of the large abdominal cavity. At labour the child has to pass through the bony pelvis, which forms the main obstacle to delivery.

Above the narrow, basin-shaped pelvic cavity, the bones spread out to form a much wider basin known as the false pelvis. This supports the lower part of the abdominal cavity behind and at the sides, leaving it unprotected in front.

The abdominal cavity is thus protected by bones to a considerable extent. Its upper part has the backbone behind, and the ribs at the back and sides, but is unprotected in front.

Its lower part has the backbone behind, and the pelvic bones behind and at the sides, but is largely unprotected in front. The middle portion of the abdomen, however, has no bony protection except the spine behind, for there is a space at each side between the ribs above and the hip bones below.

Thus the whole of the front wall of the abdominal cavity is composed of muscles, without bony support, and the sides of the cavity in its middle portion are also muscular. The front and side walls can thus be stretched so as to enlarge the cavity and make room for the growing womb and the child within it.

The abdominal cavity is sometimes called the *peritoneal* cavity, because it is lined by a thin, smooth skin or membrane called the *peritoneum*. Besides lining the cavity, the peritoneum provides an almost complete covering for the organs within the abdomen.

Bony Points and Landmarks

Portions of some important bones can be felt, and, in thin persons, seen through the skin. These bony points or landmarks are used in obstetrics as fixed points from which measurements can be taken. By such measurements the

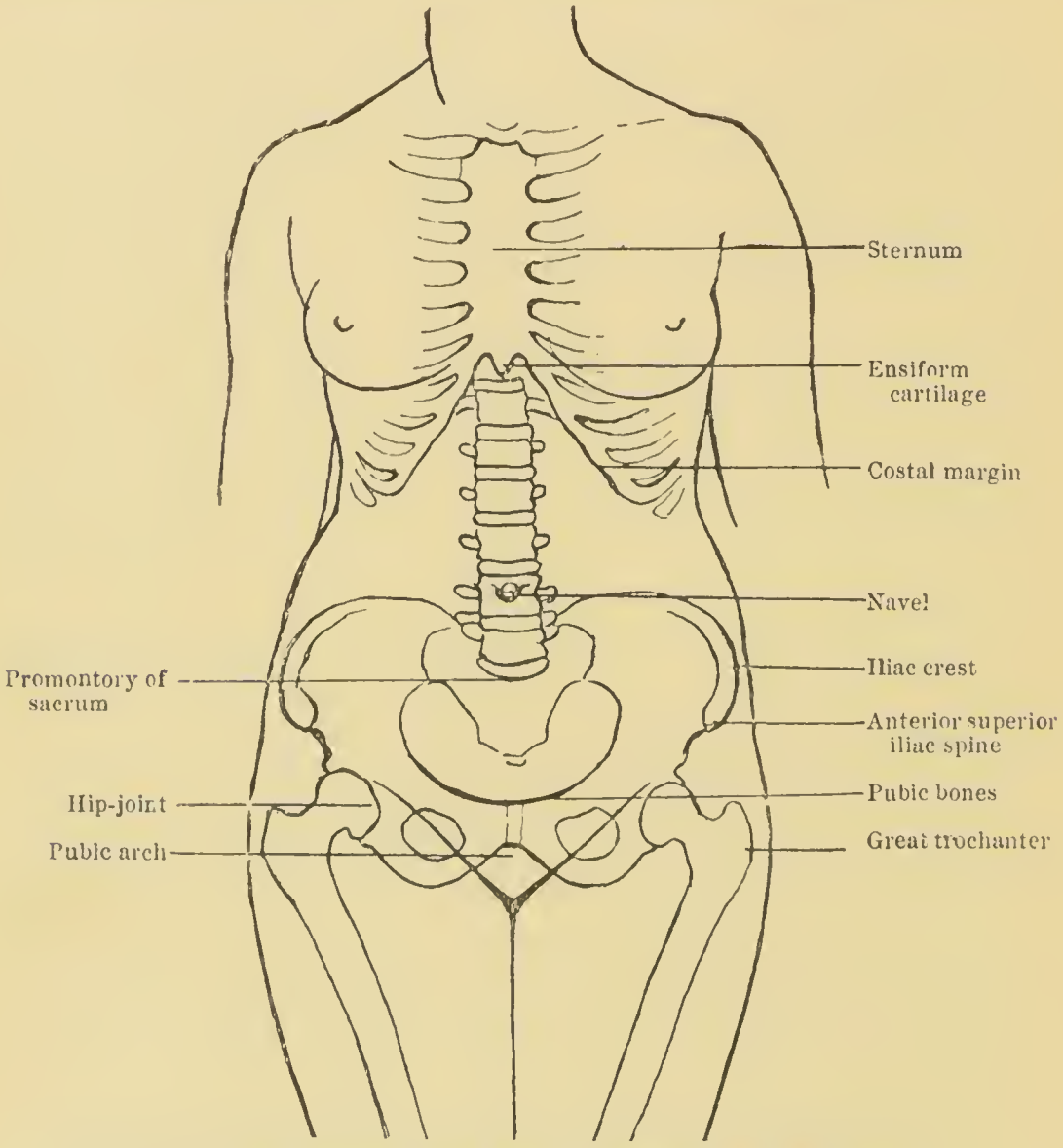

Fig. 1.—Outlines of figure and of bones from the front.

size and position of the pregnant womb are described and recorded, also the size and shape of the bony pelvis in each patient.

The lower end of the breastbone or *sternum* is called the *ensiform cartilage.* Just below this the wall of the abdomen is soft in the middle line of the body,

but on either side it is strengthened by the lower ribs. The edges of the bony wall formed by these ribs are called the *costal margins*. Leaving the lower end of the breast-bone they separate gradually and reach the sides of the body about the level of the waist.

At each side of the body, below the waist, is a great

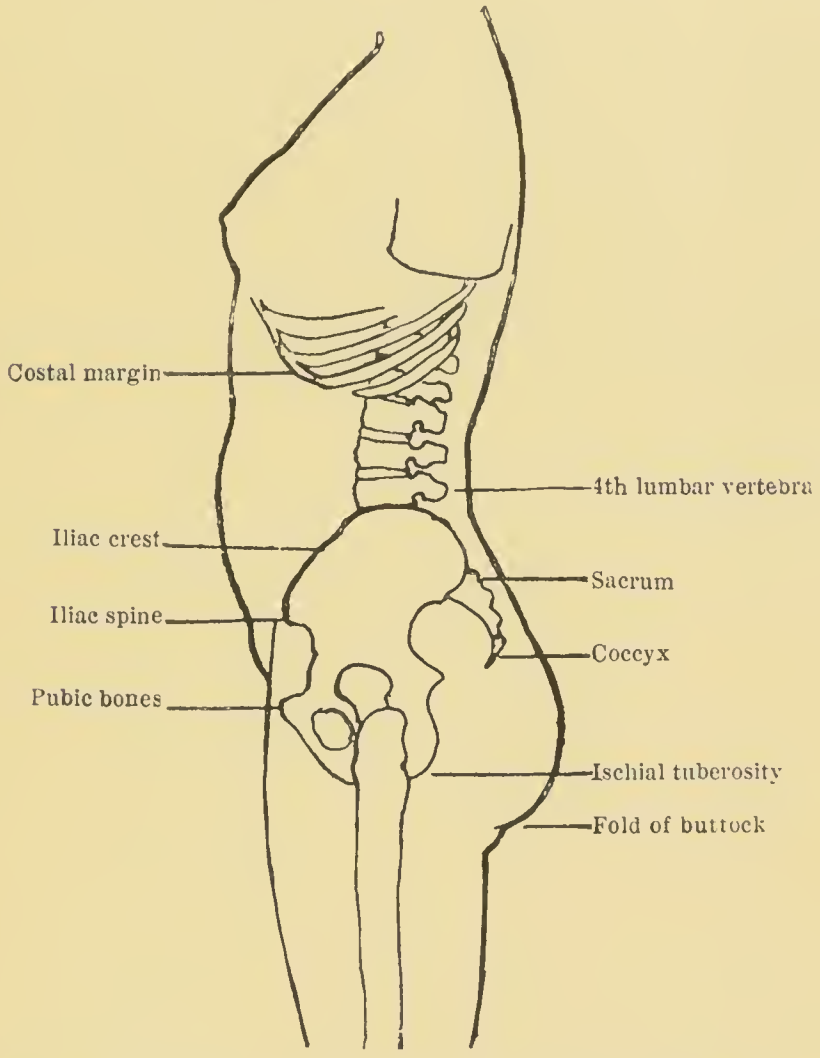

FIG. 2.—Outlines of figure and bones from the side.

rounded ridge of bone—the upper border of the hip bone or *ilium*. It can be felt to run back till it joins the backbone, and forward until it ends in a rounded knob above the upper part of the front of the thigh. The ridge is called the *iliac crest*, or the *crest of the ilium*, and the knob is called the *anterior superior iliac spine*. The lower part of the abdomen is called the *pubic* region, and

the hair which grows on it is called the pubic hair. In this region the front of the ring of bone enclosing the pelvic cavity can be felt. This ridge of bone is the upper margin of the united pubic bones or *pubes*, which meet in the middle line of the body. About an inch lower, the

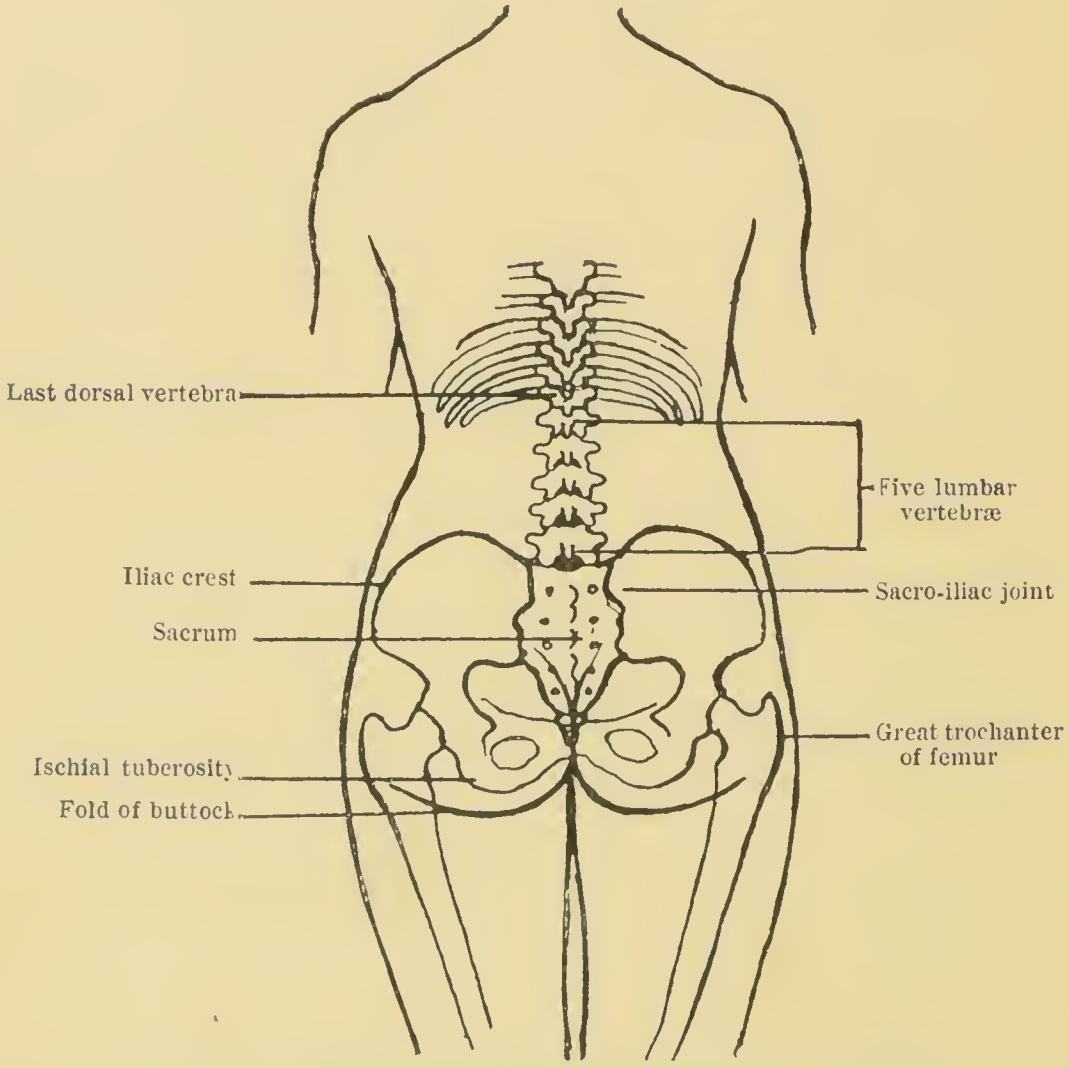

FIG. 3.—Outlines of figure and bones from behind.

lower margin of the pubic bones can be felt, forming an arch—the *pubic arch.*

The prominent knob of bone at the upper end of the outer side of each thigh is the upper end of the thigh bone, and is called the *great trochanter.*

Two other bony bosses that can be easily felt are those on which the weight of the body rests in sitting. These are called the *ischial tuberosities*, because they are

parts of the *ischial bones*, which help to form the bony pelvis. At the very bottom of the backbone a slightly movable tip can be felt. This is called the *coccyx*.

The firm part of the backbone to which the hip bones are attached is easily felt through the skin. It is called the *sacrum*. The iliac or hip bones are joined to it at the *sacro-iliac joints*. The position of these joints can be seen as well as felt in most people, because there is a dimple as a rule over each sacro-iliac joint.

The separate bones which form the backbone are called *vertebræ*. Five vertebræ are joined together to form the sacrum. The five vertebræ above the sacrum are called lumbar vertebræ, so the fifth lumbar vertebra is the bone resting on the upper end of the sacrum. The projection from the back of the fifth lumbar vertebra is the *fifth lumbar spine*. It can be felt in the middle line, an inch and a half above the two dimples which mark the position of the sacro-iliac joints. These points have some importance, as will be seen later.

External Reproductive Organs

The *external genitals* or *pudenda* are those parts of the body which have to do with childbearing and can be seen.

The part on which the pubic hair grows is often called the *mons veneris*. Passing downwards and backwards, this divides into two portions with a cleft, slit, or furrow between them. The cleft is called the *vulva*, and the two sides are called the *labia majora* or larger lips of the vulva. Each lip, or *labium majus*, has hair on its outer side, but not on its inner side which touches the inner side of the other *labium majus*.

Behind the vulva is the opening of the bowel. This is called the "seat" by patients, but doctors and nurses always call it the *anus*. The part between the vulva and

the anus is called the *perineum.* This is all that can be seen without separating the labia majora.

If these are held apart, two smaller lips can be seen, one at each side. These are called the *labia minora*;

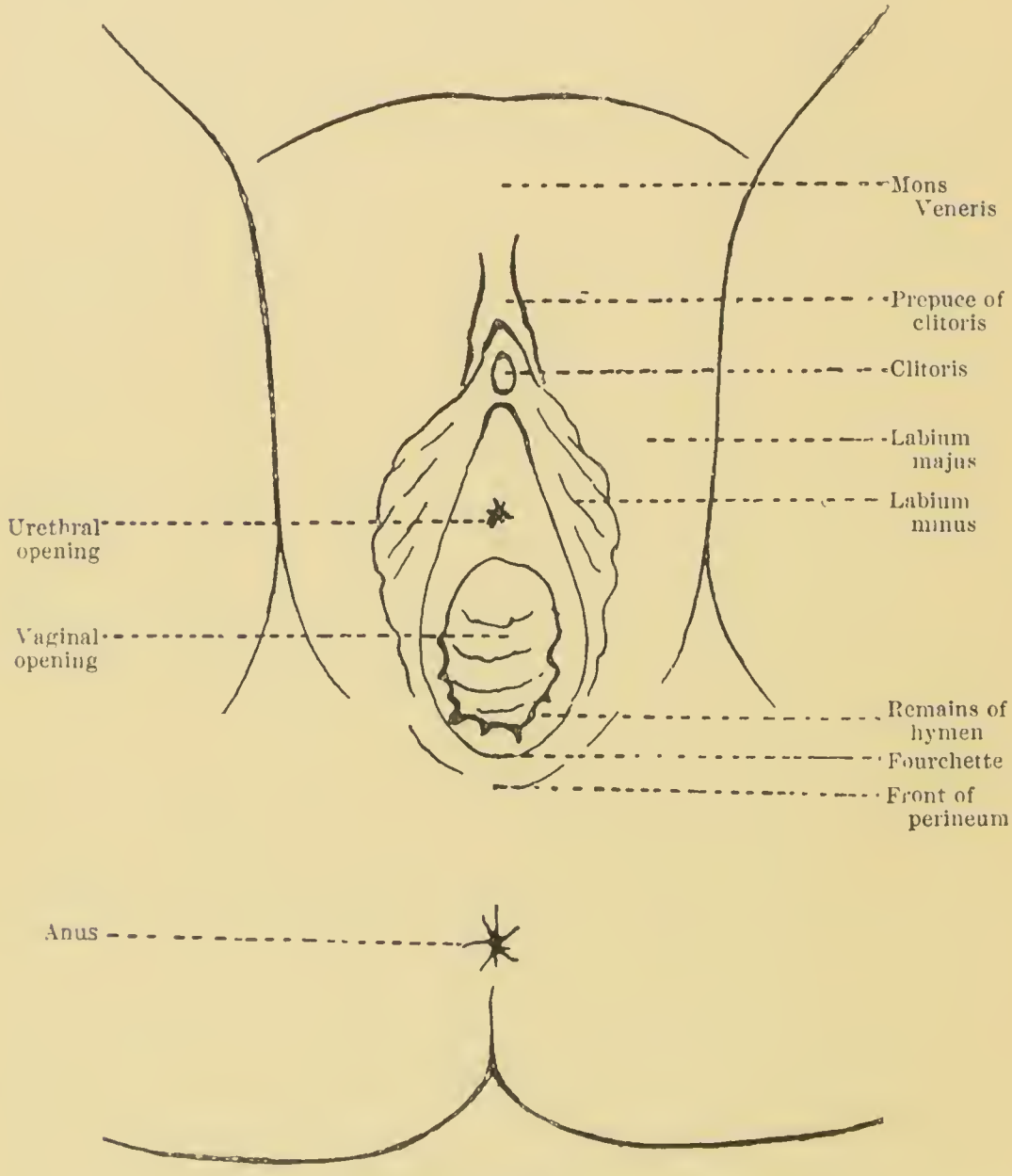

FIG. 4.—The external genital organs.

each separately is a *labium minus.* Where they meet in front they enclose a small rounded structure called the *clitoris,* and just below this is seen, in a triangular space, the opening of the *urethra* or water passage coming from the bladder.

Just behind this is another opening, small in unmarried

girls, but much larger in women who have had children. This is the opening of the birth canal or *vagina*. The labia may be said to unite behind the vaginal opening to form a fold of skin called the *fourchette*. The actual mouth of the vagina where it opens into the vulva is more or less surrounded by a thin ridge called the *hymen*, which somewhat narrows the opening. This hymen is torn after marriage, and the fourchette is torn at the first confinement, the vaginal opening being thus considerably enlarged.

Internal Reproductive Organs

The internal reproductive organs are those parts of the body concerned in child-bearing which lie hidden within the pelvis. Together with the bladder and the lower end of the bowel, which is called the *rectum*, they occupy the basin-shaped space walled in by the ring of pelvic bones more fully described later. Three openings were mentioned above, namely: (1) the urethral aperture, and (2) the vaginal aperture, both of which open into the vulva; and (3) the anus, opening behind the perineum. The bladder communicates with the first opening by the water passage or urethra. The womb or *uterus* communicates with the second opening by the *vagina* or *vaginal canal*.

The lower part of the bowel is called the *rectum*. It lies rather to the left side of the pelvis and it communicates with the anus by a short passage called the *anal canal*.

The vagina is thus a tube, narrow below but wide above, which leads to the other internal reproductive organs. It has the bladder in front of it and the rectum behind it, while the womb lies just above it and opens into its upper portion. Patients often refer to the vagina as the "front passage" or "birth passage," while when they mention the "back passage" they mean the rectum.

The other internal reproductive organs are the two *ovaries*, the two *Fallopian tubes*, and the womb or *uterus*.

The ovaries are solid organs, about the size and shape of almonds, lying one on each side of the pelvis. It was mentioned that the abdominal cavity, of which the pelvic cavity is a part, has a lining—the peritoneum. This lining

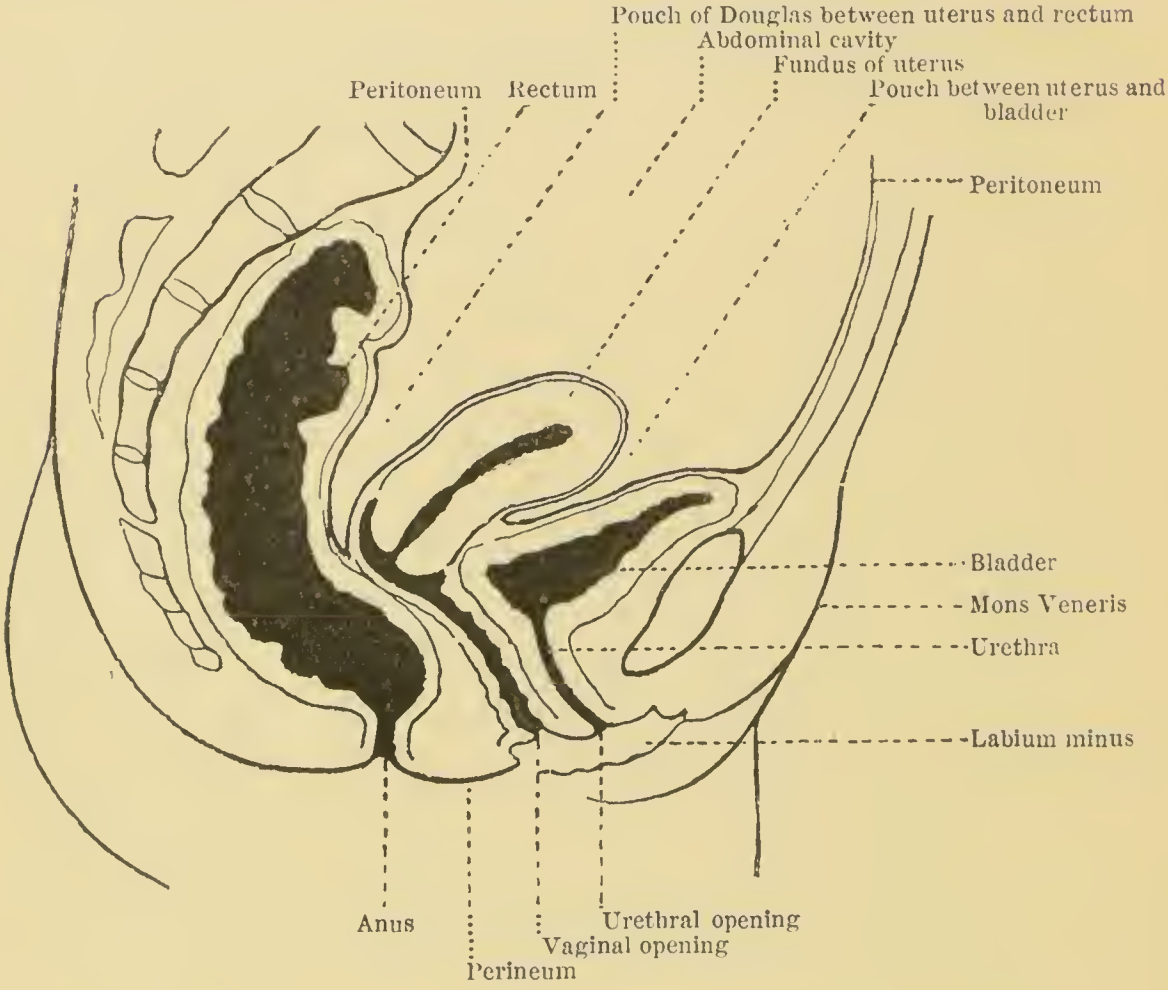

FIG. 5.—Section of the pelvic organs. The body is supposed to be cut exactly in half, and the diagram represents the cut surface of the left half of the pelvis.

forms a fold which runs across the pelvic cavity from side to side. The ovaries are attached to the back of this fold. Their work is to produce eggs or *ova*, which, when shed from the ovary, escape into the abdominal cavity.

The *uterus* is in the middle of the pelvis between the layers of the fold, so that it is covered by the peritoneum both in front and behind. The portion of the fold of

peritoneum on each side of the uterus is named the *broad ligament.* Thus each broad ligament extends between the uterus and one side of the pelvis.

In the upper margin of each broad ligament, lying, like the uterus, between the layers of peritoneum, is a tube called the Fallopian tube. These tubes are about as thick as penholders. Each tube opens at its outer end into the abdominal cavity near the ovary. The inner end of each tube opens into the womb or uterus. The use of

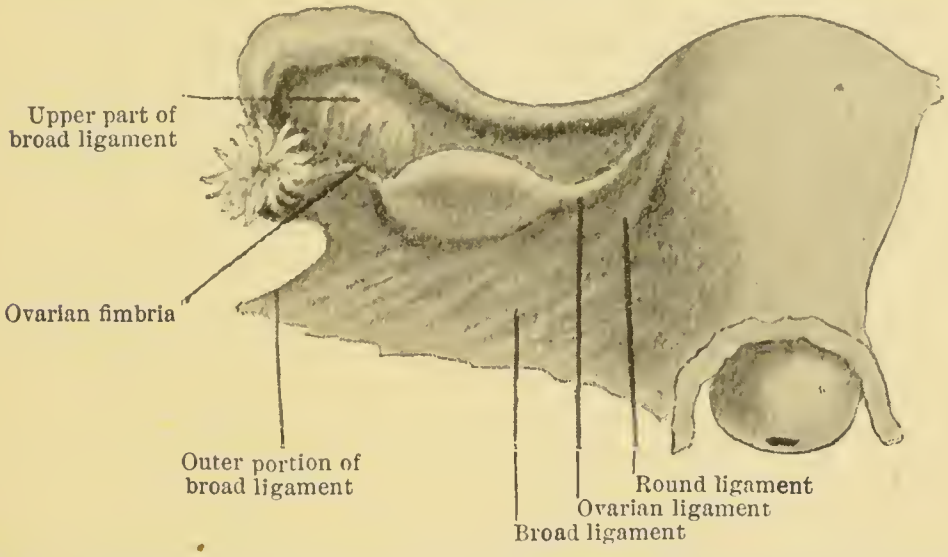

FIG. 6.—The uterus seen from behind, with the left broad ligament, ovary, and Fallopian tube. Half natural size.

the tubes is to convey eggs from the abdominal cavity into the uterus.

The womb itself is really a bag with muscular walls half an inch thick. It is rather like a pear in shape, being broader above than below. It is three inches long; two inches wide above, one inch wide below; and one inch thick. It has three openings. The Fallopian tubes open into it above, one on each side, and the cavity of the uterus itself opens downwards and backwards into the upper part of the vagina.

The uterus has two parts: an upper, called the *corpus* or *body*; and a lower, called the neck or *cervix.* The upper part of the body of the uterus is called the *fundus.* The

narrow portion of the uterus between the body and the cervix is called the *isthmus*.

The hollow within the body of the womb is flat and three-cornered, one tube opening into each of the upper corners. It is one inch and a half long and one inch wide. At the lower corner the cavity opens into the cervical canal by a narrow opening called the inner mouth of the

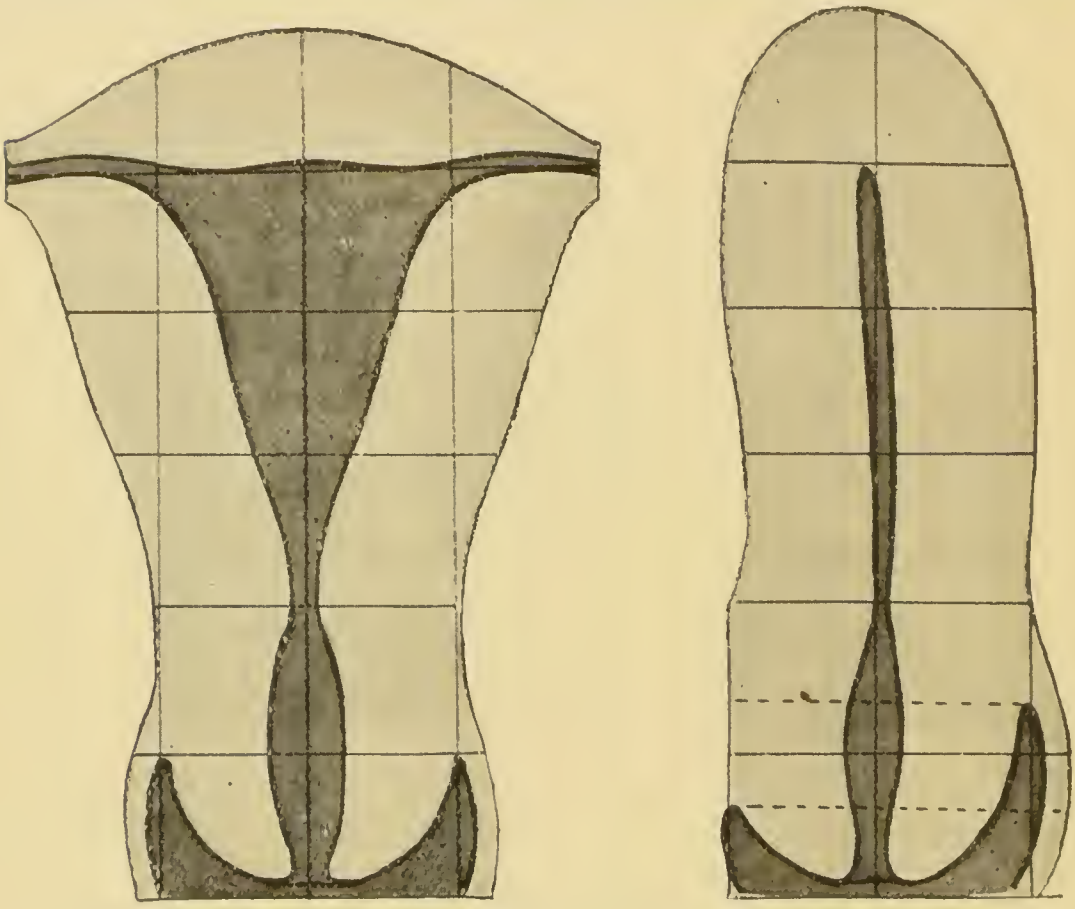

Fig. 7.—Uterus cut through A, from side to side; B, from back to front, to show its shape, the form of its cavity, and its three openings. The sections are drawn over half inch squares to show the measurements of the organ.

womb or *os internum*. The cervical canal is one inch long. It opens into the vagina by the outer mouth of the womb or *os externum*.

The lower portion of the cervix dips or projects into the vagina, so that when a finger is passed up the vaginal canal the cervix is felt as a smooth, rounded body, about as firm as the tip of a person's nose. In the middle a dimple or hole is felt, which is the external os. In women

who have had children the os feels like a slit across the cervix instead of like a dimple. This is because the cervix is generally split more or less during labour. The split runs from side to side, dividing the cervix into a front, or anterior lip, and a back, or posterior lip.

The womb is lined by a soft, smooth lining called a mucous membrane. The vagina, the bladder, the rectum, and many other parts of the body, such as the mouth and nose, are also lined by membranes called mucous membranes because they form a substance called mucus. When a person has a bad cold in the head, the discharge from the nose is mostly mucus, passed out by the inflamed and irritated mucous membrane. In ordinary circumstances the amount of mucus formed in the uterus and vagina is small, and does not escape from the vulva, though examination shows that the vagina contains a small quantity of cream-like fluid. In certain states too much of this creamy fluid is produced, and then it runs out and stains the clothes. Patients speak of this discharge as "the whites." Doctors and nurses call it leucorrhœal discharge

PUBERTY, OVULATION, MENSTRUATION AND THE MENOPAUSE

WOMAN'S life may be divided into three periods. The first is girlhood, the second is that during which children may be born, and the third is the time during which this is no longer possible.

Certain changes occur at the beginning of the child-bearing period which mark the passage from girlhood to womanhood. These changes are spoken of as puberty. Other changes which occur at the end of the child-bearing years are known as the change of life, or the menopause. At puberty the breasts enlarge, the hips become wider, hair grows upon the pubes and in the armpits, and the reproductive organs begin to do the regular work which they continue to perform throughout the child-bearing period. The outward and visible sign of this change is the appearance of the "courses" or "monthly periods."

But still more important is the work of the ovaries, which begins at puberty, and goes on unseen until the change of life. Every month an egg or *ovum* becomes ripe, and, at last, escapes from the ovary into the abdominal cavity. It then enters one of the Fallopian tubes and passes down into the inside of the uterus. If the egg is fertilised, conception occurs, and the egg stays within the uterus and produces a child. If conception does not occur, the egg passes down the vaginal canal with the monthly discharge of blood and is lost. The shedding of eggs or *ova* from the ovaries is called *ovulation*, and this is a necessary part of reproductive life, as without the egg there can be no pregnancy and no child.

Menstruation is the name given to the monthly discharge of blood and mucus from the uterus known by various names, such as the "poorly time," the "unwell time," or the "courses."

Menstruation commonly begins at the age of thirteen, fourteen, or fifteen, though it may be earlier or later.

The menses may be regular or not regular. They are

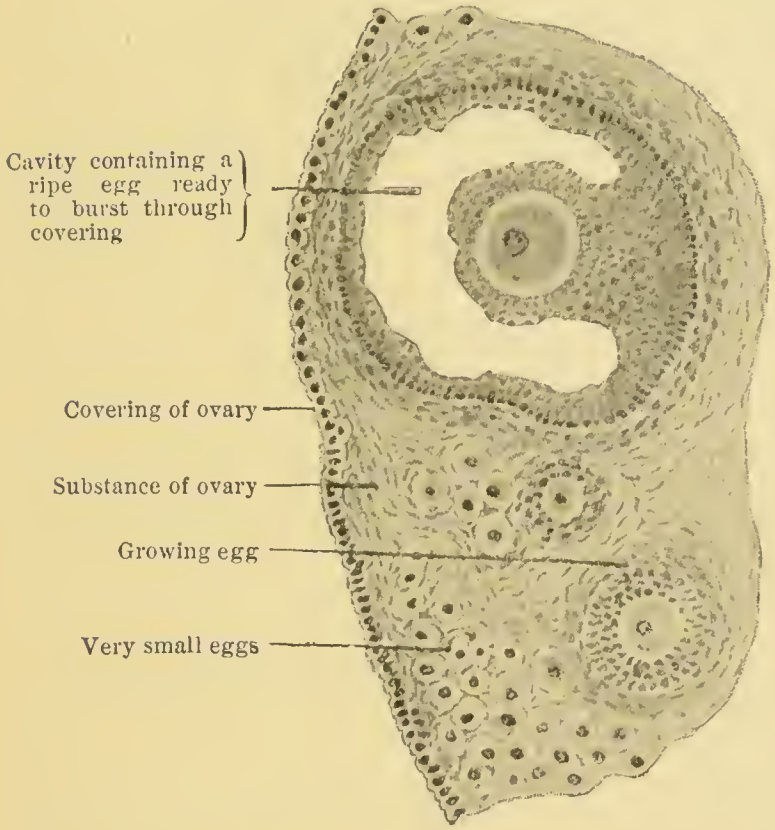

FIG. 8.—Section of part of an ovary very much enlarged, as seen through a microscope.

regular if the patient can tell beforehand which day she will next be unwell. In persons who are regular, the discharge commonly begins every twenty-eight days, that is, every four weeks on the same day of the week. In some the discharge begins regularly every thirty-one days, in others regularly every twenty-six days, in a few it begins regularly every twenty-one days. All these are regular. But if a person cannot say when her next poorly time will begin she is "irregular." Some patients

when asked if they are regular, answer that they are "too regular." This of course is nonsense, but what patients mean by this is that they are unwell too often or too much.

The menstrual discharge usually lasts from three to five days. The blood which comes from the lining of the womb mixes with the creamy mucous discharge in the vagina. At first it appears to be almost pure blood. Later it becomes paler in colour, as there is less blood and more mucus. It is difficult to calculate the quantity of discharge in different people. Roughly it is considered that a woman who uses twelve diapers loses an ordinary amount. If the discharge continues less than three days, the period is considered short; if it lasts for more than a week, the period is too long.

Fig. 9.—Ovary cut across, the cut surface showing the remains of a cavity from which an ovum or egg has been shed. Natural size.

The uses of three words should be understood: *Menorrhagia* means excessive duration or excessive quantity of discharge at periods. *Metrorrhagia* means discharge of blood at times other than the proper menstrual periods. *Amenorrhœa* means absence of the discharge at menstrual periods.

The menses are absent in healthy women during pregnancy, and in most cases the periods do not return while a woman is suckling a baby.

During various unhealthy states the monthly periods cease, quite apart from pregnancy and suckling. Thus bloodless girls cease to menstruate for months together, because they have no blood to spare. In women suffering from consumption or other exhausting diseases the same stoppage is noticed. When disease of the ovaries prevents the ripening and shedding of eggs,

menstruation also ceases. Thus amenorrhœa is the natural state before puberty, during pregnancy and suckling, and after the change of life. At other times it is unnatural and indicates ill-health requiring medical attention.

It is often said that a woman should not continue to suckle a child after the return of the menses, and this is a good rule in most cases; but there are some women who menstruate regularly and nurse children at the same time without any injury to the health of mother or child. It is very common for women to go on suckling for months longer than they should, because they think they will not conceive again while nursing. But pregnancy often begins before suckling has ceased, and children should always be weaned at the proper time, that is at nine or ten months of age.

Many women have a mistaken idea that it is not safe to take baths during the monthly periods, and that they must not change their clothes until the discharge has ceased. Some do not even dare to wash the pudenda when "unwell." It should be very clearly understood that extra care as to cleanliness is desirable at these times, and that the external parts should be washed even more frequently than usual. It should not be necessary to insist that dirty clothes should be exchanged for clean ones just as at other times. There is no reason whatever why warm baths should not be taken during menstruation, indeed a very hot bath is one of the best means of relieving the pain which so many women suffer at these times. Cold baths and sea-bathing are to be avoided during menstruation by most people, though there are many who do not even alter their habits to this extent.

Parents and school-mistresses should realise that puberty is a time of the utmost importance in the life of a girl. Extra care should be taken of the health during the few

months after menstruation begins. Overwork at school and overwork of all kinds should be carefully avoided. Bodily and mental fatigue may be caused by play as well as by work, so a girl's amusements, like her serious employments, should be controlled at this time.

The change of life, which is also known as the menopause, occurs most frequently between the ages of 45 and 50, though it is often earlier and often later. The periods may stop suddenly or gradually. Irregularities of all kinds may occur at this time, and there is usually some disturbance of the general health. Patients complain of hot flushes and of cold sweats, and are more nervous than usual. After menstruation has ceased most women either lose or gain weight, and as a rule recover their health rapidly. It is a very important fact that cancer of the womb is the commonest cause of a blood-stained vaginal discharge coming on after the menses have ceased. For this reason any woman who has a coloured discharge after reaching the change of life should have medical attention without delay.

PREGNANCY

The Egg or Ovum

The egg-shell of a bird's egg contains a large quantity of food—the yolk and the white—as well as the egg itself. The growing chicken is nourished by this food until it is hatched. But the eggs of animals which suckle their young have no yolk, no white and no shell. Thus they are very small—so small that they cannot be seen without a microscope. Instead of being sat upon in a nest, they form young animals inside the womb of the mother, where they are nourished by the mother's blood.

The egg of a woman, after escaping from the ovary, passes down one of the Fallopian tubes until it reaches the cavity of the uterus. By this time, if fertilised, it has already begun to grow, and it has the power of eating or burrowing into the soft mucous membrane which lines the womb. The egg quickly buries itself within this lining and the hole by which it enters is quickly sealed up by a little clotted blood.

The egg or ovum now grows in such a manner that it forms a little round bag with a double wall. Within this bag lies the future child, which is called the fœtus or the embryo, attached to the inner wall of the bag by a cord called the umbilical cord. The two walls of the bag are called the membranes of the ovum. The inner membrane is the *amnion* and the outer membrane is the *chorion*. The bag contains a quantity of fluid, the liquor amnii,

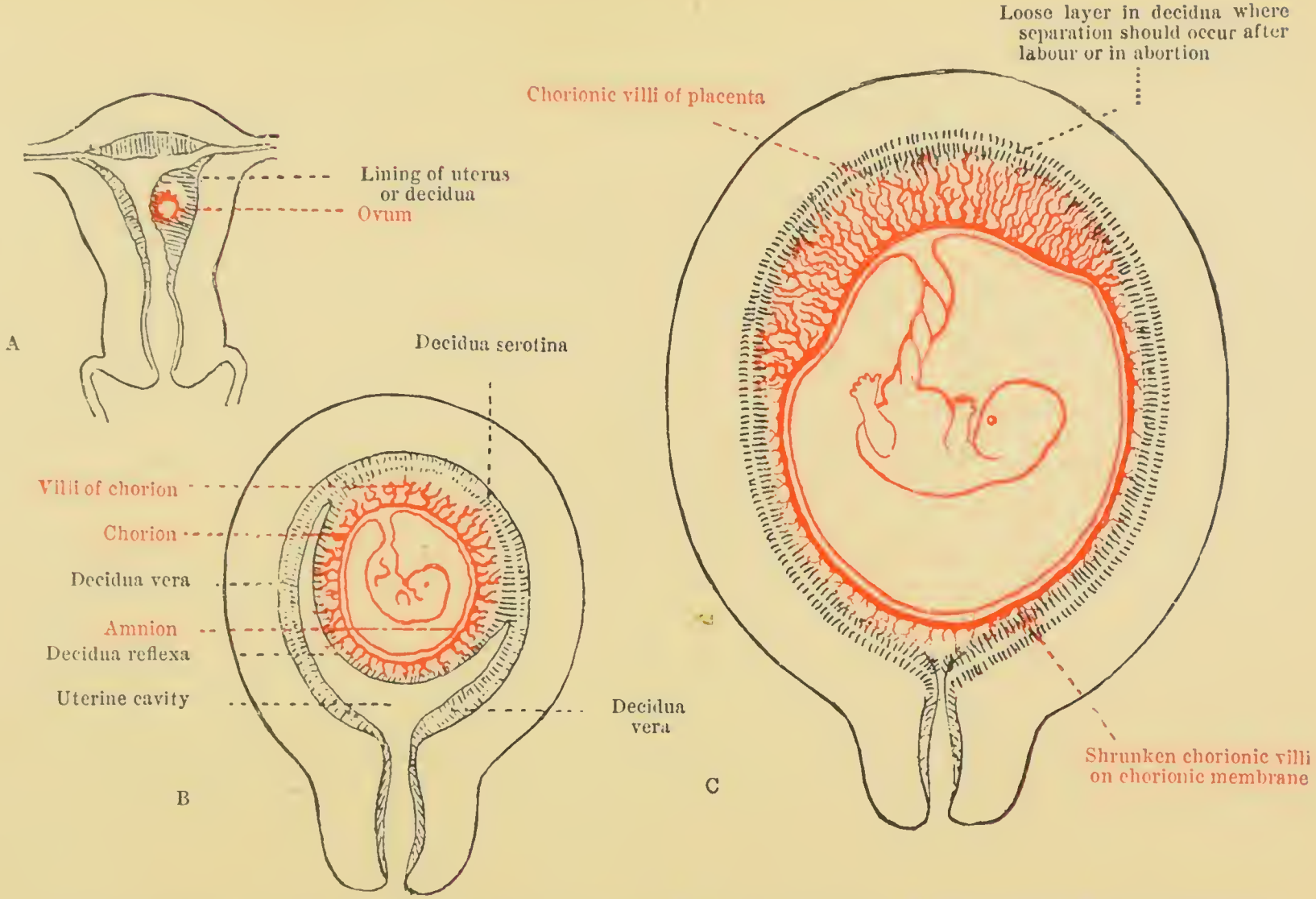

FIG. 10.—Diagrams of the ovum and uterus. A, after a few days. B, before the formation of the placenta. C, after the formation of the placenta. Everything in red is formed from the ovum.

in which the fœtus is free to move. The outer surface of the chorion is shaggy, for it is covered with thread-like branching outgrowths called *villi*. Many of these villi push their tips into the walls of the cavity in which the ovum lies, and attach it firmly in its bed. Here it lies, bathed in the mother's blood, which constantly flows around it and nourishes it.

Towards the end of the third month of pregnancy the egg is about the size of the egg of a goose, and is losing its shagginess except at one portion, where the villi of the chorion grow stronger and thicker and soon form the afterbirth or placenta. We shall return later to the subject of the fœtus lying in the liquor amnii, enclosed in its double-walled sac and attached by the cord to the thickened part of the sac wall. For the present, remember only that the fœtus and its two membranes, the amnion and the chorion, are formed in the first few days of pregnancy; that the placenta is formed by the end of the third month; and that the whole ovum goes on growing steadily in size as the months pass.

Symptoms and Signs of Pregnancy

The changes that can be noticed in the mother during pregnancy must next be considered.

The symptoms which lead a woman to think she is with child are as follows :—

First is the stoppage of the monthly periods, and this is a very important sign in a woman who is in good health and has always been regular. Occasionally menstruation may occur during the first two months of pregnancy, but after that the ovum completely fills the cavity of the uterus, so that there is no longer any free surface from which blood can escape.

So many women suffer from sickness during the second

and third months that this is looked upon as a symptom of pregnancy. The vomiting is generally in the early part of the day and is known as morning sickness.

From about the tenth week the patient may complain of some tenderness and swelling of the breasts.

From about the sixteenth week she may notice some enlargement of the abdomen.

"Quickening" is the name given to the feelings caused by active movements of the child in the womb. These movements are generally first felt about twenty weeks after the beginning of pregnancy.

These are the symptoms which call the patient's attention to her condition. But several other changes may be observed if looked for.

The breasts become large, firm and tender. They feel knotty to the touch, and from the third month onwards a drop or two of milk may be squeezed from the nipple. In women pregnant for the first time this is a useful sign, but milk can often be found in the breasts of those who have recently suckled children even when they are not pregnant.

The pink skin round the nipple is called the *areola*, or primary areola. This becomes darker in colour during early pregnancy—especially in persons of dark complexion. Later the skin outside the areola becomes darkened, and is called the secondary areola.

If the breasts are very much enlarged the skin is stretched till its inner portion cracks. This produces scars called *striæ*, which are purplish when new, but gradually become whiter than the rest of the skin.

Early in pregnancy, darkening of the skin may be seen, especially in dark people, in a line from the navel or umbilicus to the pubes. Sometimes this line extends above the navel. It is called the *linea nigra* or black line.

Enlargement of the abdomen is not visible until the fourth month, for the growing womb remains till then within the pelvic cavity. During the second three months the fundus or top of the uterus can be felt between the pubes and the navel. During the last three months it can be felt between the navel and the ensiform

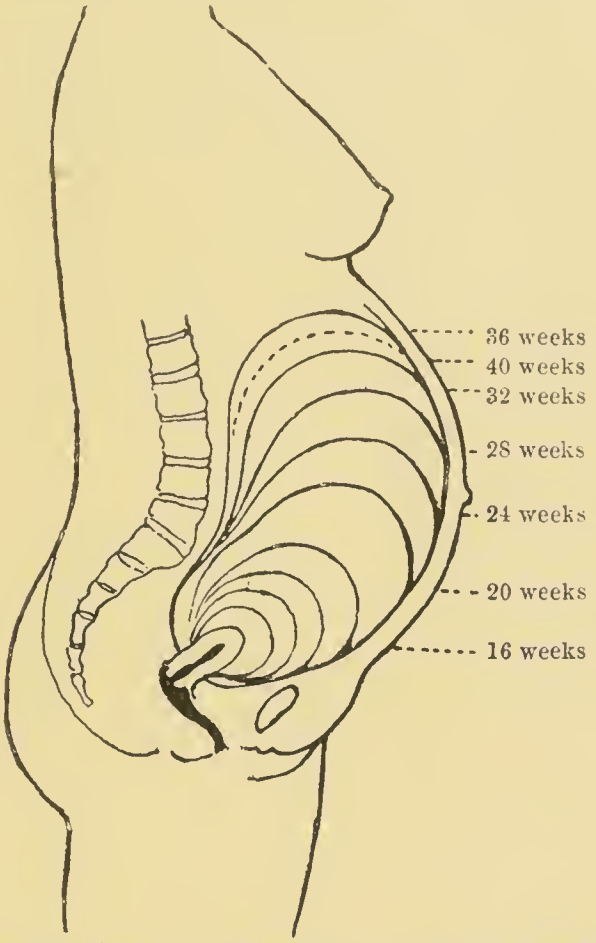

Fig. 11.—Diagram to show the level up to which the fundus is in contact with the abdominal wall at different stages of pregnancy. Side view.

cartilage. When the skin of the abdomen is stretched by the growing uterus, it cracks like the skin of the breasts, and the cracks or striæ can be seen, purplish at first and white later. In a woman pregnant for the second time,[1]

[1] A pregnant woman is often said to be gravid, and a woman during her first pregnancy is called a "primi-gravida."

A primipara or primiparous woman is one in her first labour.

A woman who has been confined is said to be a parous woman.

A woman who has never had a child at term is a 'nullipara" or nulliparous woman.

white striæ produced during the first pregnancy are often seen together with fresh purple ones caused by the second pregnancy. In young patients the skin is more elastic than in older ones; those who have their first child at the age of 18 or 19 often have no striæ, or only a few.

From the fourth month the uterus can be felt through the abdominal wall. For abdominal examination the patient lies on her back with the head and shoulders raised and the knees bent, for in this position the muscles of the wall of the abdomen are not so tense as if the patient is lying quite flat.

The womb feels soft and yielding, like a bag not quite full of water. At times it becomes harder and more tense under the hand. This occurs when the muscular wall of the womb contracts, for uterine contractions go on all through pregnancy.

During the last half of pregnancy the heart-beats of the child can be heard through the abdominal wall of the mother, either with or without a stethoscope, which is the instrument used in order to avoid applying the ear directly to the skin of the patient. The fœtal heart-beats sound like the ticking of a watch heard through a pillow. They are nearly twice as quick as the mother's heart-beats or pulse, and are difficult to count, as there are 140 or 150 in one minute, while the mother's pulse-rate is generally about 80 to the minute.

During the later months of pregnancy parts of the child can be felt through the mother's abdominal wall, and through the wall of the womb. Thus the child's head is recognised, and also its back and its limbs. The move-

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A multiparous woman or "multipara" is one who has had several confinements. Sometimes a woman in her second labour is called a secundipara, or ii-para, and the expressions iii-para and so on are often used in making notes of cases.

ments of the limbs may often be felt by the hand. It is important to remember that the only absolute proofs of pregnancy are feeling parts of the child and their movements, and hearing the fœtal heart sounds.

The external genital or reproductive organs are soft, swelled, and moist during pregnancy. The lining of the vagina is moist, soft, and folded. It is darker in colour than usual, and has a violet or purplish hue.

The cervix feels softer than usual to the examining finger, and after the fifth month it feels shorter than usual.

Before the enlarged uterus can be felt through the abdominal wall it can be accurately examined by the two-handed or bimanual method. Two fingers of one hand are placed in the vagina, and the other hand is placed on the lower part of the abdomen. The womb can then be felt between the fingers of the two hands. Enlargement can be noticed from about the sixth week onwards. At this time the neck of the womb feels narrower and softer than usual, while the body of the womb feels rounder and softer than usual. Considerable experience is needed before these signs can be recognised.

Summary of the Symptoms and Signs of Pregnancy

Symptoms.

1. Amenorrhœa.
2. Morning sickness.
3. Quickening.

Signs.

1. **Changes in the Breasts.**
   - Primary areola darker.
   - Secondary areola.
   - Increase in size and firmness.
   - Secretion of milk.
   - Striæ in skin.

2. **Changes in the Abdomen.**
   - Linea nigra.
   - Striæ in skin.
   - Uterine enlargement.

3. **Changes in the Vagina.**
   - Softening.
   - Increased secretion of mucus.
   - Violet colour.

4. **Changes in Uterus.**
   - Softening of cervix.
   - Gradual enlargement of uterus with characteristic feeling and shape.

5. **Fœtal Movements, Sounds, and Parts.**
   - Movements seen and felt.
   - Fœtal parts felt.
   - Fœtal heart sounds heard.

Duration of Pregnancy and Date of Labour

Labour usually begins about 280 days after the beginning of the last menstrual period. The average duration of pregnancy is considered to be 280 days, or 40 weeks. It is usual to speak of this time as nine calendar months, but it is important to remember that the time is really ten periods of four weeks each, or ten lunar months, and thus corresponds to ten menstrual periods. In some women gestation lasts longer than 40 weeks, and in others it is shorter, but in calculating the date of labour we can only take the average period of 40 weeks.

It is frequently necessary to say when a patient is likely to be confined, and this is usually done by counting from the first day of the last unwell time. When a patient can tell the date on which her last period began, labour is most likely to occur about 280 days from that date.

It is convenient to keep a table like that below, which tells at a glance the date which is 280 days from any given date.

TABLE FOR CALCULATING PROBABLE DATE OF LABOUR

JAN.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	NOV.
OCT.	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	
FEB.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28				DEC.
NOV.	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	1	2	3	4	5				
MAR.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	JAN.
DEC.	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	
APRIL	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		FEB.
JAN.	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4		
MAY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	MAR.
FEB.	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	1	2	3	4	5	6	7	
JUNE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		APRIL
MAR.	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6		
JULY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	MAY
APRIL	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	1	2	3	4	5	6	7	
AUG.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	JUNE
MAY	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	
SEPT.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		JULY
JUNE	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	1	2	3	4	5	6	7		
OCT.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	AUG.
JULY	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	
NOV.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		SEPT.
AUG.	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6		
DEC.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	OCT.
SEPT.	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	1	2	3	4	5	6	7	

Find the date of the first day of the last period in small type. The date below it in larger type is the probable date of labour.

A simple way is to count nine calendar months forward from the date given, and then add on one week. This

is a rough method, but it is as likely as any other to give a correct result.

The patient often is unable to give the date of the last menstruation. Many make no note of such events. Sometimes pregnancy begins while a child is being suckled, and before the menses have returned. Sometimes

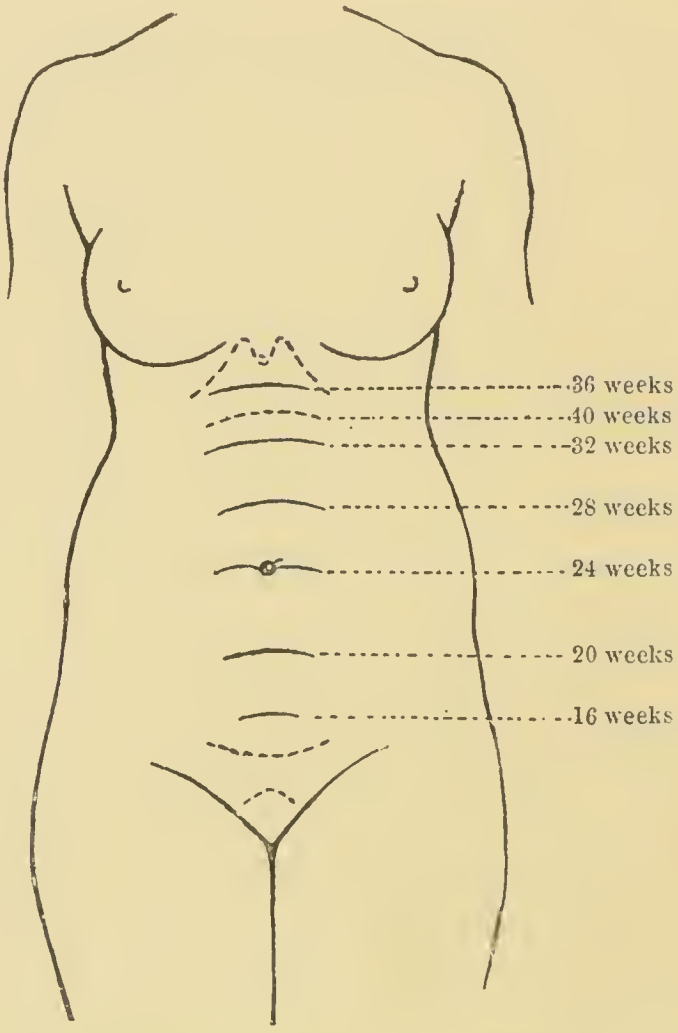

Fig. 12.—Height of the fundus during pregnancy. Front view.

pregnancy begins during a period of amenorrhœa, due to ill-health. In these cases the date of quickening, if the patient remembers it, may be of some use, as labour is likely to come on about 20 weeks after movements of the child are first felt.

If no dates are known, it is necessary to judge the stage which pregnancy has reached by the size of the

uterus, and the position of its fundus or highest part. This varies so widely in different cases that it is only a rough guide as to the date of labour. At the 24th week the fundus is generally just above the navel. At the 36th week it is about 1½ inches below the ensiform cartilage.

MANAGEMENT DURING PREGNANCY

The health of the pregnant woman should be carefully watched (1) to save her present suffering; (2) in order that she may be confined under advantageous conditions; and (3) so that she may expect a healthy child. If all is well, pregnancy should not cause much disturbance in a sound woman. Her health should be good throughout. In any but the slightest departures from health the advice of a doctor should be sought.

The quantity of food eaten should not be increased during pregnancy, but in many cases in which vomiting is troublesome it is desirable to eat only a little at a time, small meals being taken at more frequent intervals than usual. All alcoholic drinks should be avoided. When morning sickness is troublesome, a warm drink before getting out of bed in the morning is a source of great relief. Sea-bathing is generally forbidden. Some patients find it desirable to avoid very hot and very cold baths, but the ordinary warm bath should never be omitted.

It must be remembered that labour demands prolonged muscular exertion on the part of the patient. For most women, their first confinement is the hardest day's work they have ever done in their lives. Women of the working classes have the easiest labours, because their daily labour strengthens their powers of muscular endurance. Women who are not of the working class should be trained for labour, just as men are trained for athletic competitions. Thus during pregnancy women should have as much exercise as possible short of actual fatigue. The exercise should not be violent, but gentle and prolonged, and should be taken in

the open air as much as possible. Late hours should be carefully avoided, also all indiscretions in diet, and it is desirable to shun all crowded meetings, theatres, lecture halls and places of worship.

The great trouble of ordinary healthy women during pregnancy is constipation, and if this trouble is not overcome more serious ones may follow as a consequence of it. The bowels can sometimes be kept regular by a plentiful supply of fruit and fresh vegetables, and by the free use of brown bread, oatmeal, figs and prunes. If it is not found possible to secure a good motion every day by varying the food, it is necessary to use medicines which stimulate the actions of the intestines.

What is wanted is not an occasional purgative, but something to act continuously as a bowel tonic. This want is perhaps best met by the drug called Cascara Sagrada. This drug has become well known to the public, but it is generally used in quite a wrong manner. It is taken at odd times after periods of constipation, instead of a pill or a black draught. The proper way in which to use cascara is to take it in small doses three times daily after food, going on with it for weeks at a time, and gradually reducing the dose after the habit of constipation is overcome. Another matter that is not understood by the public is the use of "salines." These are medicines such as Epsom-salt, Seidlitz-powders, and the various aperient waters, and they should be taken, not at night, but just after waking in the morning.

Many people suffer from constipation because they do not drink enough fluid. They may have found that drinking freely at meal-times causes them to suffer from indigestion and have wisely reduced the amount of fluid taken with food. In these cases water should be taken freely two hours or more after each meal, to supply the daily quantity of fluid necessary.

A good time for taking extra fluid is on waking in the morning, and half a pint of water at that time, hot or cold as may be preferred, is a great aid in the management of constipation and also in the treatment of morning sickness. The water may with advantage be flavoured with a pinch of common salt.

If the pregnant woman takes cascara regularly and aids its action by a small dose of some saline or a copious drink of water on waking, the bowels may still refuse to act every day. In these circumstances she should keep an enema syringe at hand, and every day when there is no natural motion at the usual time she should have an enema of warm soap and water. There is a strong but unfounded prejudice against the use of the enema, and naturally it is not desirable to form a habit of its daily use. But by taking proper means to regulate the bowels, and by using the enema every day on which these means fail, the habit of constipation can generally be broken.

The subject of dress during pregnancy demands some attention. After the fourth month the growing uterus quickly enlarges the abdomen, and causes a corresponding increase in the size of the waist. But patients generally desire to preserve their ordinary figure as long as possible, and they tend to wear their corsets unaltered in size until pregnancy is far advanced. The corsets prevent the uterus from growing upwards, and force it forward while keeping it low down in the abdomen. Thus the walls of the lower part of the body are unduly stretched and forced out of shape. The parts thus overstretched and bulged do not completely recover their tone after the confinement; so that by preserving a waist during pregnancy the mother not only interferes with the proper growth of her unborn child, but also ruins her own figure for life. A sure means of impressing on a patient the importance of dressing properly during pregnancy is to

explain this to her. The best way to dress from the fourth month onwards is to have the clothes made to hang from the shoulders, leaving the abdomen perfectly free to enlarge in the natural way.

A change of this kind is unfortunately too expensive or too inconvenient for all but a few patients, and the majority will continue to use corsets. To them it is necessary to explain that the true use of the corset is to protect the soft part of the body between the lower ribs and the hip bones from being pressed upon by the bands which support the lower garments. This part of the body wall has no bones in front or at the sides, but the stiff corsets form a bridge across the soft part, from the ribs above to the hips below, and so protect the delicate organs within the abdomen from the pressure of the skirt bands. Thus to answer their purpose the corsets should be very firm and stiffly boned, should be quite straight in front, and should also be made so that the girth can be freely enlarged from time to time to accommodate the growing womb, without exerting any downward pressure upon it.

During the later months many patients find much comfort in wearing a belt or binder which grips the hips tightly and supports the abdomen from below. Belts are sold for this purpose, but a strip of flannel 14 inches wide, and long enough to go once and a half round the body, serves very well. It should be applied when the patient is lying on her back, tight below and loose above, like the binder used after labour. Its lower border should grip the hips, reaching below the great trochanters of the thigh bones.

During the later months the skirts hang far away from the legs, and the heavy skirts usually worn in cold weather drag heavily on the waist. It is therefore well to make patients wear thick woollen knickers and light

skirts, securing warmth by the under garments instead of by the outer.

Garters should be avoided, as there is a tendency to varicose veins and to swelling of the legs and feet which is made worse by anything preventing the free return of the blood to the body.

The nipples often require some care during pregnancy. Many patients, especially before their first confinements, have very small, flat nipples which do not stand out at all from the surface of the breast. This is often the result of the pressure of the corsets. If it is not remedied the child may find it difficult or impossible to get hold of the nipples. The patient should be instructed to pull them out with her fingers several times a day, and to dress in such a way that they are not pressed in by the clothes.

When the skin of the nipples is thick and rough, it is very likely to crack, and thus cause much suffering after labour when the baby begins to suck. The thickened skin should be softened and removed by frequent bathing and by the application of some oily substance such as vaseline or lanoline. It used to be a common custom to "harden" the nipples with scent, whisky, or other alcoholic spirits. But the harder the skin, the more easily it cracks. What is really wanted is the soft, elastic condition of the skin which is best secured by the use of greasy substances.

LABOUR AS OBSERVED AT THE BEDSIDE

THERE are very few warnings or premonitory signs that labour is about to begin. The fundus of the uterus reaches its highest level, and thus is nearest to the ensiform cartilage two or three weeks before the end of the gestation period. During the last fortnight or so the head of the child sinks lower into the pelvis than before, especially in women who are bearing their first child. This allows the fundus to fall away a little from the ensiform cartilage and the margin of the ribs. The patient then breathes more easily than before, but finds more difficulty in walking, and may have to pass water more frequently. Just before labour the pudenda become still more soft and moist than during pregnancy, and there may be a free discharge of mucus.

The First Stage of Labour.—The real beginning of labour is signalled by abdominal discomfort leading up to the occurrence of those attacks of pain which are called "labour pains." Labour pains come on at more or less regular intervals. The pain is felt first in the back, and passes round the sides to the front of the abdomen. It begins gradually, grows stronger, and lasts for some moments before passing gradually away. The patient does not hold her breath during the early stage of labour, but can cry out freely while the pain lasts.

If the hand be placed on the abdomen when a pain is coming on, the uterus can be felt to become harder and firmer. As the pain grows the uterus is felt to raise itself away from the backbone and stand out more clearly in front, pressing forward the abdominal wall. It is felt

to soften again as the pain passes off, and it sinks backwards in the abdominal cavity against the backbone.

At the end of pregnancy the cervix is soft and short, and a finger passed up the vagina discovers the os large enough to admit the finger-tip, especially in women who have previously borne children. Vaginal examination after the beginning of labour reveals the fact that each pain opens out, enlarges, or dilates the mouth of the womb. The membranes of the ovum cover over the os during pregnancy, and it follows that as soon as the internal os is opened out a portion of the membranes must be separated from the wall of the womb. This causes some bleeding, so that as soon as labour really begins there is a blood-stained discharge from the vagina which is called "a show." This is one of the signs that labour is going on.

Thus "labour pains" have the following characters. They usually begin in the back. The womb can be felt to contract while they last. They come on at more or less regular intervals. They cause dilatation of the cervix, and thus, by separating the membranes over the os, cause the blood-stained discharge called a show.

Patients often complain of abdominal pain near the end of pregnancy which is due to causes other than labour. The common cause of these pains is contractions of the bowel, such as patients name "spasms" or "gripes." They are called "false pains," and they can be distinguished from true labour pains, because they do not begin in the back, but in the abdomen. They do not come on at regular intervals. They are not accompanied by hardening and prominence of the womb. They do not cause dilatation of the cervix, and they are not followed by a blood-stained "show" from the vagina.

As the first stage of labour goes on, the pains become more regular, last longer, and are stronger and more severe.

The patient will walk about, she will lean over the end of the bed, and may call out loudly during the pains.

After dilatation has gone on for some time, one or more fingers can be passed through the os, and that part of the child can be felt which is "presenting" at the mouth of the womb. This is generally the child's head. Between the head and the fingers, the mem-

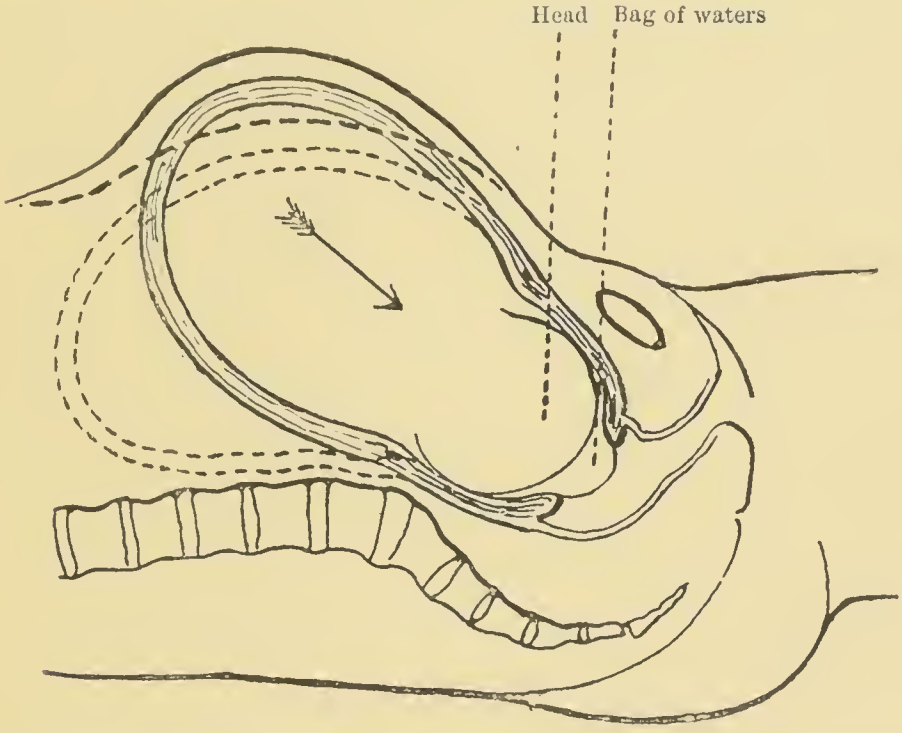

FIG. 13.—Diagram to show the change in shape and position of the uterus during contraction. The dotted line shows the uterus lying back on the spine. The plain line shows it bulging the abdominal wall and standing up from the spine during a pain.

branes are felt. When a pain comes on they bulge and form a tense bag which is filled with some of the liquor amnii. This liquor amnii which gets between the head and the membranes is called the "fore waters," because it is before the head. The part of the membranes containing it is called the "bag of waters." As the pain passes off the bag of waters again becomes soft, and the finger feels the head with nothing except the membranes in front of it. The pressure of the bag of waters and of the head gradually stretches the cervix

and lower part of the uterus, opening them out until the mouth of the womb is large enough to permit the escape of the child.

When this dilatation of the cervix is complete, the first stage of labour is over. The first stage is called the stage of dilatation and it lasts from the beginning of labour until the dilatation of the cervix and lower part of the uterus is complete.

In most cases the bag of waters breaks at the end of the first stage, and the liquor amnii escapes in a gush. Now because the membranes often rupture at the time when dilatation becomes complete, it is not uncommon to say that the end of the first stage is marked by the rupture of the membranes. This is not correct, because the membranes often break long before the cervix is completely dilated, and they frequently remain unruptured long after dilatation is over.

The Second Stage of Labour.—There is another sign which tells that dilatation is complete and the child's head has begun its escape from the uterus. This is a change in the nature of the pains. During the first stage the patient makes no use of the muscles which are under the control of the will. But when dilatation is complete, she stops calling out during the pains, and holds her breath, closing the mouth firmly.

By throwing into action the muscles of the abdominal wall, she then aids the uterus in squeezing out the child. This is called "bearing down," and the pains of the second stage of labour are known as "bearing down pains." The patient will now cease walking about, and will either lie down, or will kneel [1] by a chair or at the bedside, holding on to something with her hands, and fixing the chest by

[1] The natives of many savage countries go through labour in a squatting position, and this is really the most advantageous for the purpose. But the women of civilisation rarely have strength enough to support their own weight throughout labour.

the action of all the muscles of the upper part of the body. If in bed she will probably press with her feet against the bed foot, and will pull with both hands upon a towel fastened in a position convenient for her. By fixing the upper and lower parts of the body in these ways the patient is the better able to exert the whole of her muscular power in expulsive efforts. This action is exactly the same as that used in emptying the rectum. Indeed by "bearing down" during labour, and "straining at stool," we mean practically the same thing.

Examination of the abdomen during the second stage shows that the fundus of the uterus remains just where it was at the beginning of labour. The uterus becomes narrower in breadth, but is not lessened in length until the child is actually born. On vaginal examination the head of the child is felt coming down the vaginal canal. The cervix is no longer felt, as it soon slips over the head. When the lower part of the vaginal passage is reached, the advancing head causes the perineum to bulge, and stretches it so that the distance between the anus and the vaginal opening is much greater than at other times, being 3 or 4 inches instead of the usual $1\frac{1}{2}$ inches. The anus now opens out, forming a hole about an inch wide, through which the front wall of the rectum can be seen. If the bowels have not been well emptied before labour, fæcal masses escape from the anus at this time, as there is no room for them in the rectum when the head is passing down the vagina.

The back of the child's head at last comes into sight, and with a strong final pain is pushed outside the vulva. This is the most painful moment for the mother. The perineum often fails to stretch sufficiently, and is torn more or less, the fourchette giving way in all first cases. The hand on the abdomen now feels the fundus sink, the uterus quickly becoming smaller as soon as a portion of

the child escapes from the maternal passages. There is usually a short period of rest before the next pain comes on, and during this time the child's face turns more or less purple. The face looked towards the back when it escaped, but now it moves round to one side, and then the child's shoulders escape, quickly followed by the body and legs.

Fig. 14.—Escape of the head. Drawn from photo by Dr A. K. Melville. Shows the way in which the head is born in an ordinary labour. The back of the head has escaped first, and the forehead of the child is now passing over the perineum, which is stretched. The anus is opened widely.

There should be no bleeding at this stage, unless the cervix or the perineum has been torn.

The second stage of labour concludes with the birth of the child. It is known as the stage of expulsion, and lasts from the time dilatation is complete until the child is born.

Third Stage.—The third stage of labour is occupied by the separation of the placenta and membranes from the

uterine wall, their expulsion from the uterus into the vagina, and their escape from the vulva.

The womb now can be felt as a rounded mass, with its upper limit at about the level of the navel. The child will cry and begin to breathe, but the pulsations caused by its heart-beats can still be felt in the umbilical cord. These pulsations stop after a few minutes. As a rule, the cord is tied and cut as soon as pulsation in it ceases, but no evil effect follows if this is not done. Children are often born suddenly when the mother is quite alone, and in these cases the cord remains uncut long after the after-birth has come away, unless someone happens to come to the mother's help, or she revives sufficiently to attend to it herself.

The uterus rests awhile after the birth of the child. Then the hand on the abdomen can feel it harden again as it contracts from time to time. The patient feels these pains, but does not complain of them as a rule, and does not bear down. They are like the pains of the first stage in this respect. The effect of these pains of the third stage is to separate the placenta and the membranes from the wall of the womb. This separation allows the escape of blood from the uterine blood-vessels, and blood therefore escapes from the vulva while the third stage is going on.

After a time, it may be a few minutes only, or it may be half an hour or more, the size and shape of the uterus changes, it becomes smaller and thinner from back to front. The fingers can be passed behind it and grasp it through the abdominal wall. At the same time it rises an inch or more higher in the abdomen. These changes in size, shape, and position are signs that the after-birth has been expelled from the uterus into the vagina. Another sign is that a few inches more of the cord have escaped from the vulva. If a bit of thread is tied round

the cord just outside the vulva soon after the baby is born, 6 or 8 inches of cord will be found between the thread and the vulva after the placenta has left the uterus.

When the after-birth is lying loose in the vagina, a cough or a sneeze is enough to bring it away. When a woman has been delivered kneeling, the after-birth will drop out of the vagina itself. Down-bearing pains like those of the second stage of labour often drive it out. Old-fashioned midwives used to give snuff, so that the sneeze which followed might complete the third stage. In many cases, when the patient is lying in bed, the after-birth will lie in the vagina for a long time, and as a rule it is helped away by pressing down the uterus from above with the hand. A gush of blood generally follows the after-birth, and then the womb contracts and bleeding stops, except for a slow, gentle ooze which continues for several days. The fundus sinks below the navel after the placenta is delivered, and remains there some hours. Later it rises again as high as the navel, or a little higher, and then it begins to sink again day by day, as the womb gets smaller. The patient's pulse is very slow after labour, its rate mostly being about sixty beats per minute, while the usual rate in women is about eighty beats per minute. During labour it is faster than usual, especially during the pains. The patient often feels chilly, or may even have a shivering fit after labour. This is the result of fatigue and excitement, and soon passes off in most cases.

The Three Stages of Labour.

I. From the beginning of labour until dilatation is complete.
II. From the completion of dilatation to the birth of the child.
III. From the birth of the child to the birth of the placenta.

THE FACTORS IN LABOUR

We have now noted some of the facts which are observed at the bedside of the woman in labour, but a great deal more is known than these observations alone will teach.

Much has been learnt by dissection of bodies and by experiment in the laboratory, and the results of study of this kind must now be considered.

We must first examine more fully the forces or powers which drive the child from the mother's womb. Then we must study the passages through which the child escapes. We must then consider the shape and nature of the child's body and head, and also the nature of the after-birth. The forces or powers, the passages and the passengers (namely the child and the after-birth), are often called the factors in labour.

The Powers

The powers or forces that expel the fœtus from the maternal passages are (1) the contractions of the muscular wall of the **uterus**, and (2) the contractions of the muscles of the abdominal wall and other parts of the body. These are often called "**the accessory powers.**"

The uterine contractions during labour have a special peculiarity which must be understood as far as possible.

When a muscle contracts it becomes shortened and thickened, and when it ceases to contract, or relaxes, it returns to its original length and thickness. For example, when the arm is bent at the elbow, the mass of muscles in front of the upper arm is seen to thicken and shorten;

and when the arm is straightened, these muscles resume their original length and thickness. The uterus is a bag whose wall contains a great quantity of muscle, and when this contracts, the bag becomes smaller and its wall becomes thicker.

The uterus keeps on contracting from time to time all through pregnancy, and each contraction is followed by complete relaxation. The cavity is reduced in size during each contraction and the wall is thickened; but then the uterine muscle relaxes until the cavity is as large and the wall is as thin as before.

The peculiarity of the contractions during labour is as follows. After each labour pain the uterus does not relax completely. Its cavity is reduced in size during each pain, and it remains a little smaller after each pain is over, while the uterine wall remains a little thicker. In other words, after the contractions of labour, relaxation is not complete, but a certain amount of the contraction remains permanent. This is called **retraction,** as distinguished from **contraction**.

During pregnancy, then, the uterus contracts and then relaxes completely; while during labour the uterus contracts, relaxes incompletely, and remains retracted after each pain. It may be said that retraction is the essential feature of labour, since labour begins when retraction begins to occur. In other words, labour is a state in which the uterus remains retracted instead of relaxing completely after its contractions. As the uterine cavity gets smaller, part of its content comes to occupy the vagina, first the waters and then the head leaving the uterus. Thus at last the child is born because there is no longer room for it in the uterus.

It is not the wall of the whole uterus that contracts during labour. The muscle of the cervix and the part of the uterus near the os keeps the mouth of the womb

closed during pregnancy, just as the muscles round the neck of the bladder keep the water from escaping, and

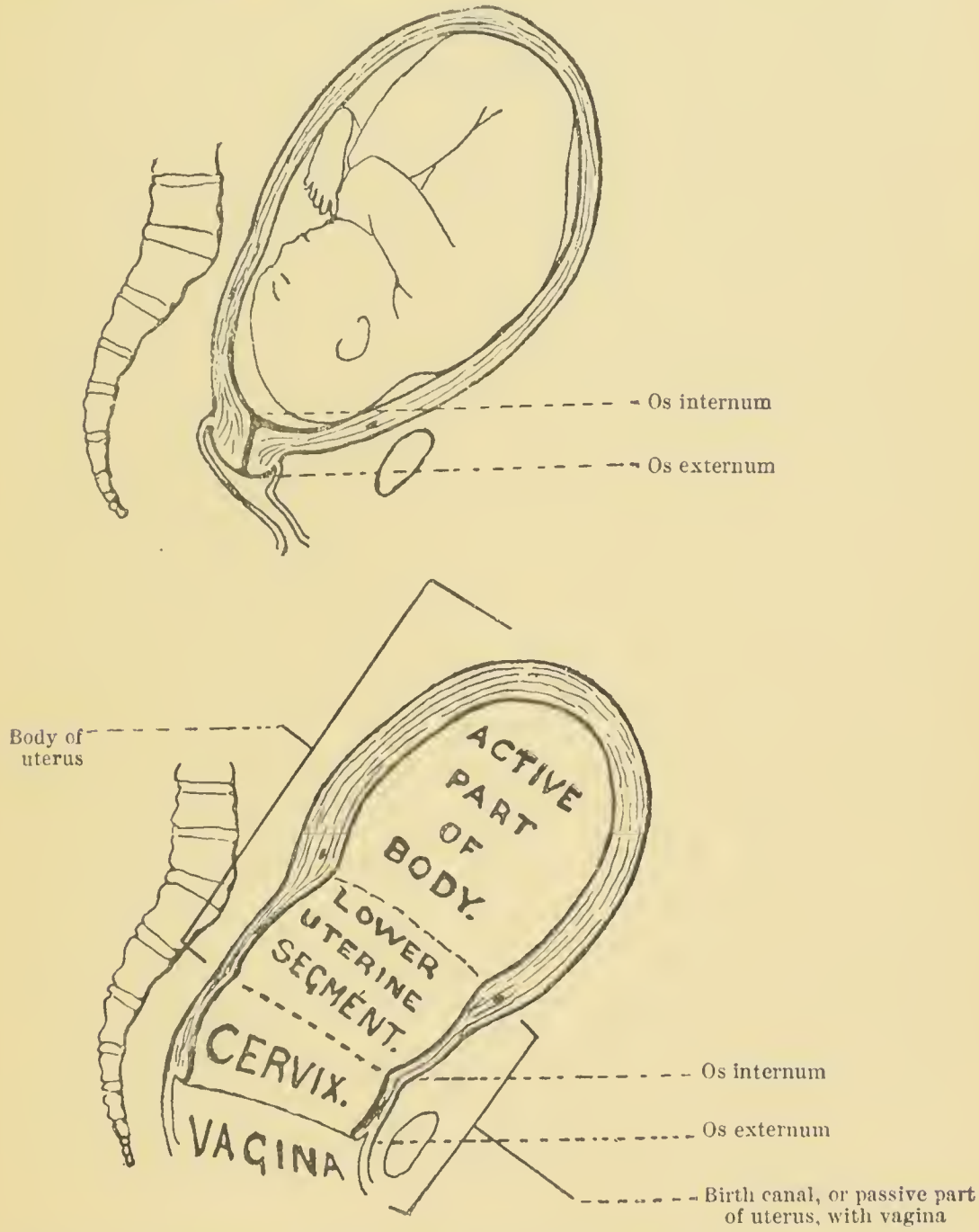

Fig. 15.—Diagrams to show how the birth canal is formed by the dilatation of the lower-uterine-segment, the cervix and the vagina. The cavity within the active part of the uterus becomes smaller as the birth canal grows larger.

just as the muscles round the anal canal keep the fæces from escaping from the rectum.

But in labour the muscles round the neck of the womb

relax and allow the mouth of the womb to be forced open. In the same way the muscles at the neck of the bladder relax when it is necessary to pass water, and the muscles round the anus relax to allow the rectum to be emptied.

The **upper** part of the uterus then, is **active**, and contracts; but the **cervix**, with that part of the body of the uterus which lies just above the internal os, is **passive**, and is dilated or opened out during labour.

The upper or retracting portion gets thicker and thicker as labour goes on, but the lower portion which is stretched becomes thinner and thinner. The lower border of the retracting portion thus comes to form a thickened ridge or ring which can be felt through the abdominal wall. This ring—the margin of the retracting portion—is called the "retraction ring" or ring of Bandl. The lower portion, which is thinned and stretched, is often called the "lower-uterine-segment."

During the first stage of labour, then, the force is supplied by the contraction and retraction of the body of the uterus alone. During the second stage the patient "bears down," and other muscles help the uterus. We breathe with all the muscles of the chest, and help these by fixing the upper part of the body with the arms. The diaphragm is a great arch or dome of muscle between the chest and the abdomen. It moves up and down when we breathe. We drive it down by filling our lungs with air, and we can hold it down by holding the breath so that the air cannot escape from the lungs. Thus women hold their breath during the down-bearing pains in order to fix the diaphragm and so aid the uterus. Again, the abdominal muscles are fixed to the chest and to the pelvis, so that to let them work at the greatest advantage the chest and the pelvis must be fixed. This is the reason why women press with their feet against the bed foot, and pull with the arms on a towel fixed

for the purpose. The weight of the child is often mentioned as a power which helps in labour. It is only of importance because we can make use of it in altering the position of the child in the abdomen, a subject to which we shall return later. During the second stage, then, the powers are (1) the uterus contracting and retracting as before, together with (2) the abdominal muscles and diaphragm, assisted by nearly all the other muscles of the body and limbs.

During the first part of the third stage the uterus again acts alone; but after the placenta is separated from the uterus and expelled into the vagina, the accessory muscles sometimes act again, and pains of a down-bearing nature help to expel the placenta from the vagina.

The Maternal Passages

The Soft Parts of the Passages.—It has been explained that the upper part of the body of the uterus is active during labour, the portion next the cervix, namely the lower uterine segment, remaining passive. Thus part of the body of the uterus is dilated, and with the dilated cervix forms the uterine portion of the birth canal or passage through which the child escapes. The lower portion of the passage consists of the vagina, which in turn is dilated by the advancing head. The lower uterine segment, the cervix, and the vagina together form a curved tube with a short front wall and a long hinder wall. The tube is about 4 inches wide. Its upper portion passes through the bony pelvis, and as this ring of bones cannot be stretched or altered in shape like the soft parts, it is the principal obstacle to the birth of the head.

It is clear that to allow of the formation of a passage 4 inches wide through the pelvis, the pelvic organs must be displaced from their ordinary positions. This happens as follows. The structures in front of the birth

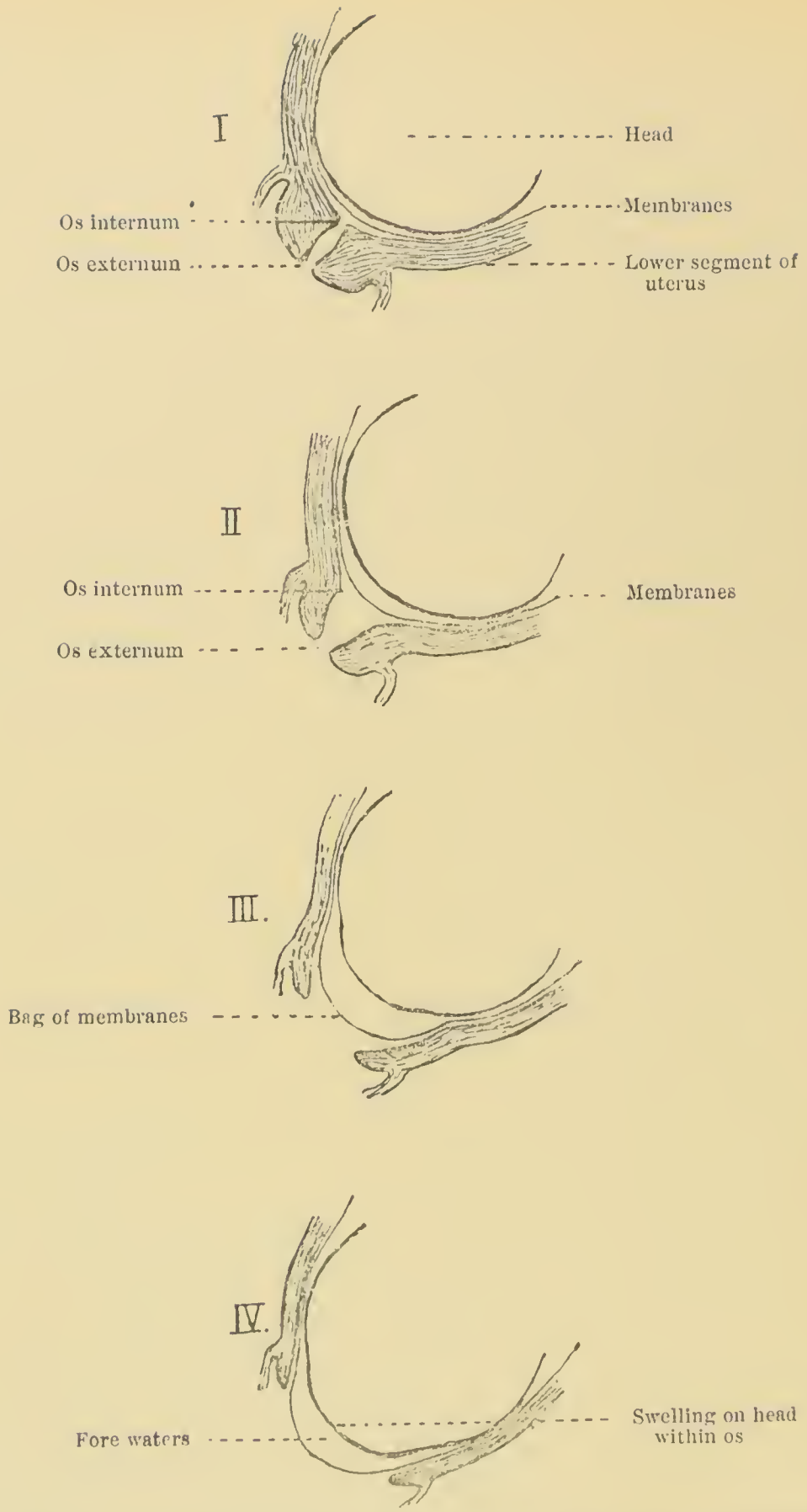

FIG. 16.—Dilatation of the cervix and lower-uterine-segment by the pressure of the bag of waters and the head. The internal os opens first and disappears, the canal of the cervix being "taken up." The external os remains with an edge, which becomes thinner and thinner as dilatation advances. The diagram applies to dilatation in primiparæ only, as in parous women the external os is often more or less open before labour begins. A swelling appears on that part of the head which is encircled by the os during dilatation.

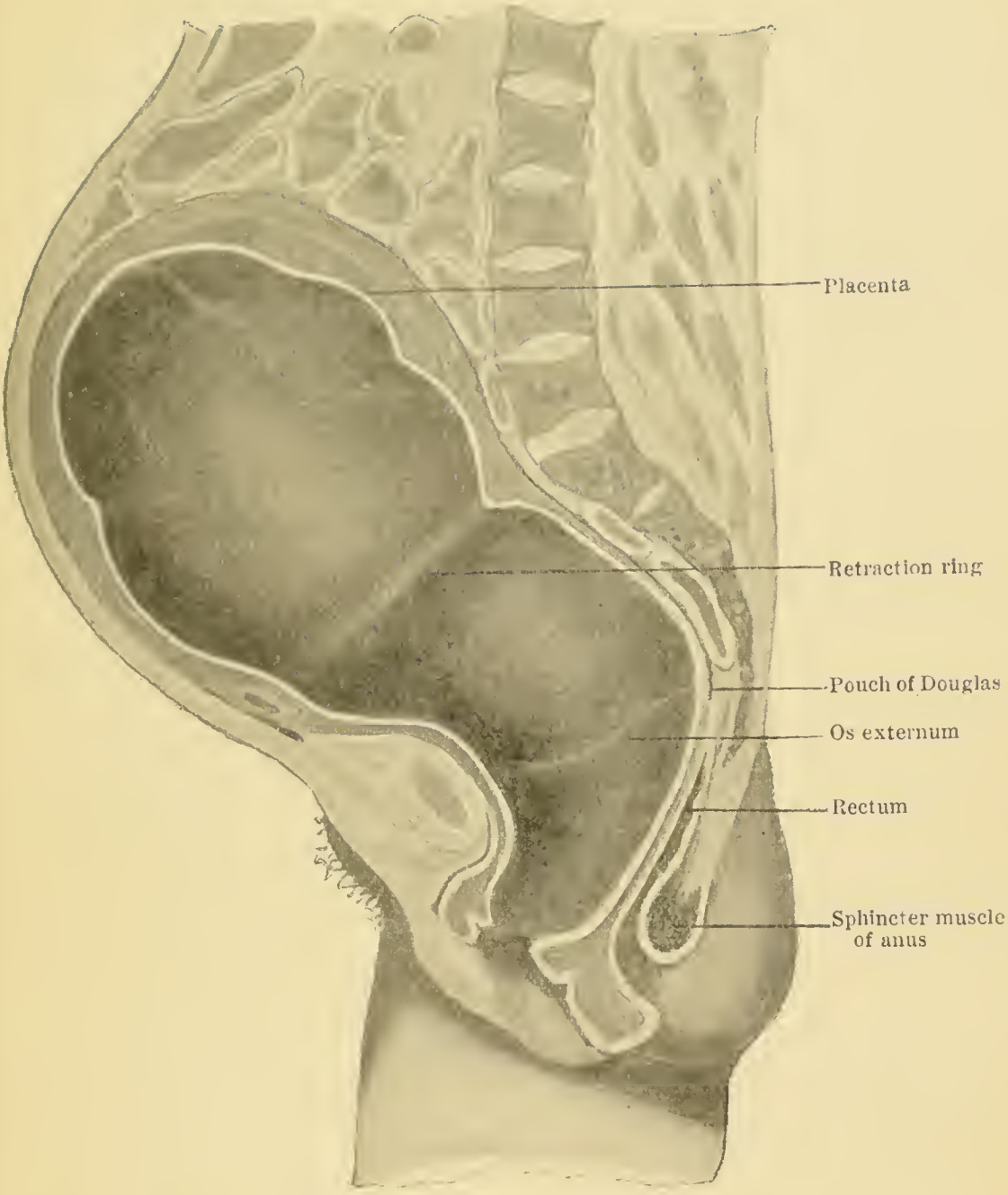

Fig. 17.—The body of a woman who died during the second stage of labour, frozen hard and sawn in half (Braune). The drawing shows the right half of the body, with the child lifted out so as to show the cavity in the active part of the uterus above the retraction ring, and the birth canal, namely, the dilated uterine segment, cervix and vagina. The bladder is seen to be drawn up above the pubes, while the rectum and anus, with the perineum and parts behind the anus, are pushed downwards and backwards.

canal are pulled up and the structures behind it are pushed down. Thus the bladder is pulled up into the abdomen out of the way, and the rectum with the anal canal and the perineum are pushed downwards.

Think of a doorway fitted with two swing doors : one of the doors may be pulled inwards, and the other may be pushed outwards, so opening the doorway to its full extent. The floor of the pelvis may be regarded as a doorway with one door in front and the other behind.

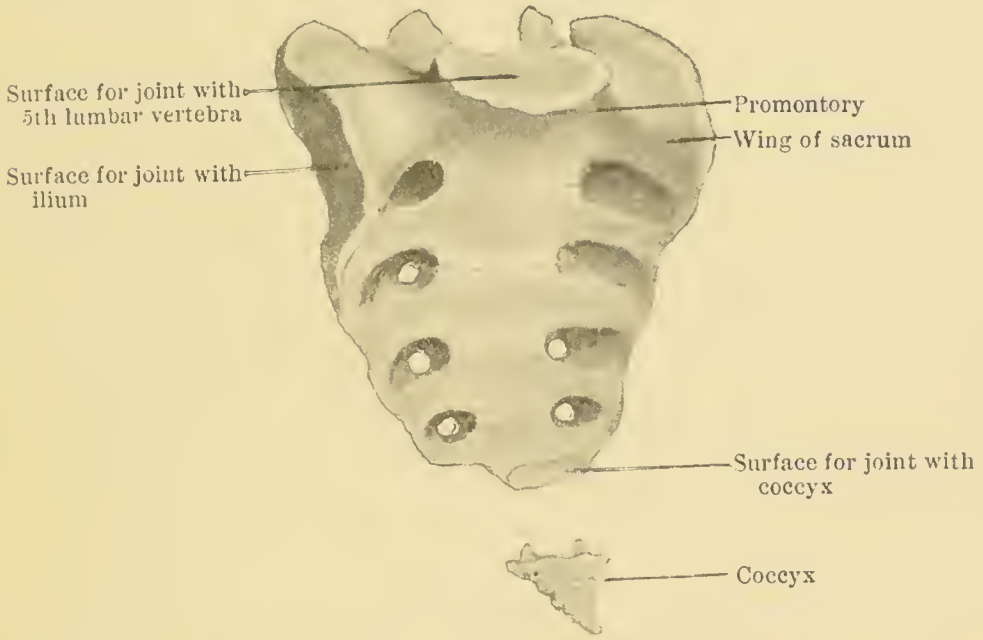

Fig. 18.—The sacrum and coccyx, as seen from the front. The coccyx is separated from the sacrum for the sake of clearness.

When the doors are closed, the front wall of the vagina and the back wall of the vagina lie touching one another. In labour the front vaginal wall with the bladder is pulled inwards, while the back wall of the vagina with the rectum and perineum is pushed outwards. The floor of the pelvis is thus opened to allow the child to pass through it.

The Bony Pelvis or Hard Parts of the Passages.—The spine or backbone is made up of a number of separate bones called *vertebræ*. Alternating with the vertebræ are thick pads of the substance called cartilage. Above are the vertebræ of the neck, then come those to which

the ribs are attached, and below these are five vertebræ called the *lumbar* vertebræ. Below these again are five vertebræ called *sacral* vertebræ firmly united or fused together into a single bone called the *sacrum*.

The **sacrum** has a smooth, hollow face and an irregular back. It is a wedge-shaped bone, broad above and narrow below. The middle of its upper surface is flattened so as to fit the cartilage below the fifth lumbar vertebra, which

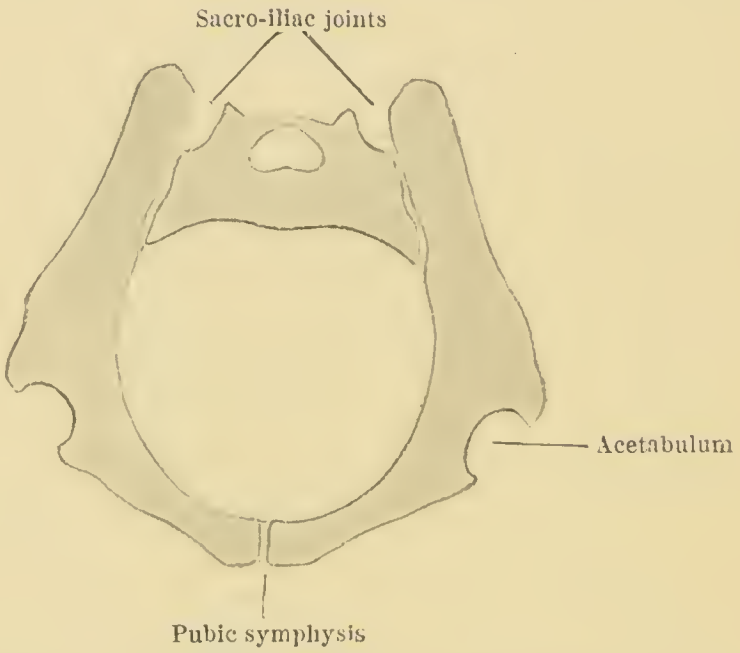

Fig. 19.—The three bones which form the pelvic ring. The sacrum above and an innominate bone on each side.

rests upon it. The joint between this vertebra and the sacrum forms an angle and projects forward into the upper part of the pelvis, and this projecting portion of the sacrum is named the *promontory*. The portions of the sacrum to the right and to the left of the promontory are called the wings of the sacrum.

The small bone called the **coccyx** corresponds to the tail of the lower animals and is composed of four small vertebræ. It is attached to the narrow lower end of the sacrum, which thus has four joints, one above, one below, and one on each side. These joints are very firm, and they allow of hardly any movement of the bones one upon another.

The sides and the front of the bony pelvis are formed by the two large bones called the *innominate* bones, which are attached to the sides of the sacrum just below the wings, and meet each other in front.

Each **innominate** bone is formed of three bones which are separately formed, but unite firmly during growth.

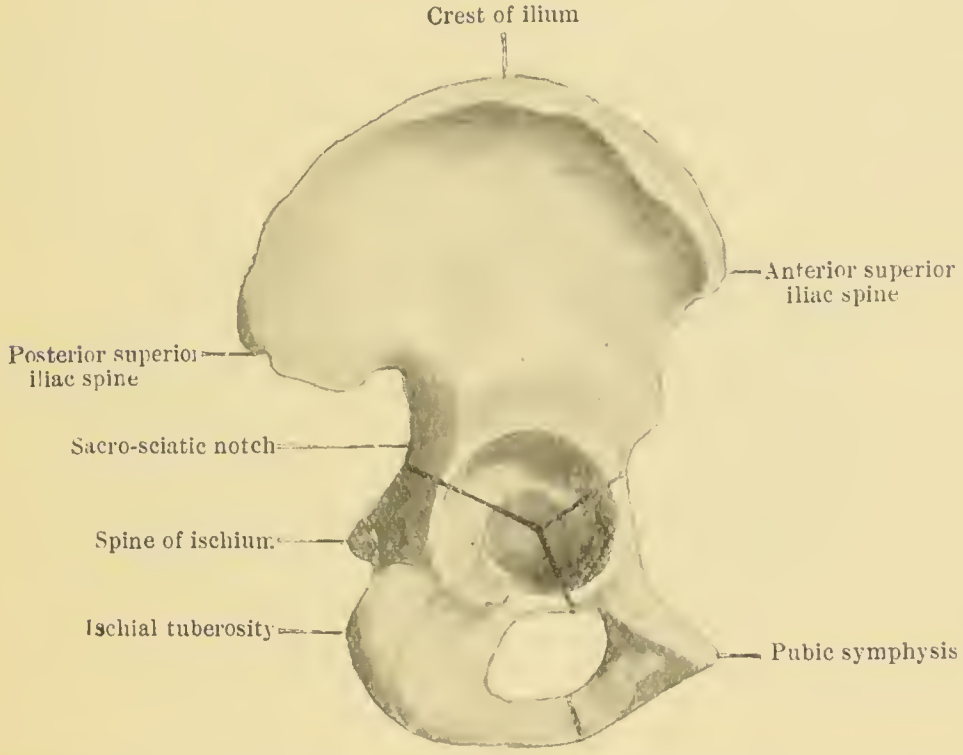

FIG. 20.—The outer side of the right innominate bone. The three dark lines meeting in the centre of the acetabulum (or socket for the head of the thigh bone) divide the whole bone into the three parts of which it is made up—the ilium, the ischium, and the pubis. The hole just below the acetabulum is the obturator foramen.

The socket into which the head of the thigh bone fits at the hip-joint is called the **acetabulum**, and it may be regarded as the centre of the innominate bone. The *ilium* is a large, flat bone with a smooth, hollow inner surface. It is attached to the sacrum by the sacro-iliac joint, and curves outwards and forward as far as the acetabulum, where it meets the other bones, namely the *ischium* and the *pubis*. From the acetabulum the ischium runs downwards, and the pubis runs forwards and

inwards toward its fellow on the other side. The pubic bone then makes a sharp bend, and running downwards and backwards unites with the ischium again, so that a hole called the *obturator foramen* is enclosed by the two bones.

The **pubic** bones of the two sides meet in front in the middle line of the body, where they are united by a firm pad of cartilage in a joint called the *pubic symphysis.*

The pelvis as a whole is more important for our present purpose than the separate bones of which it is built up. The broad, flattened portions of the iliac bones are seen to

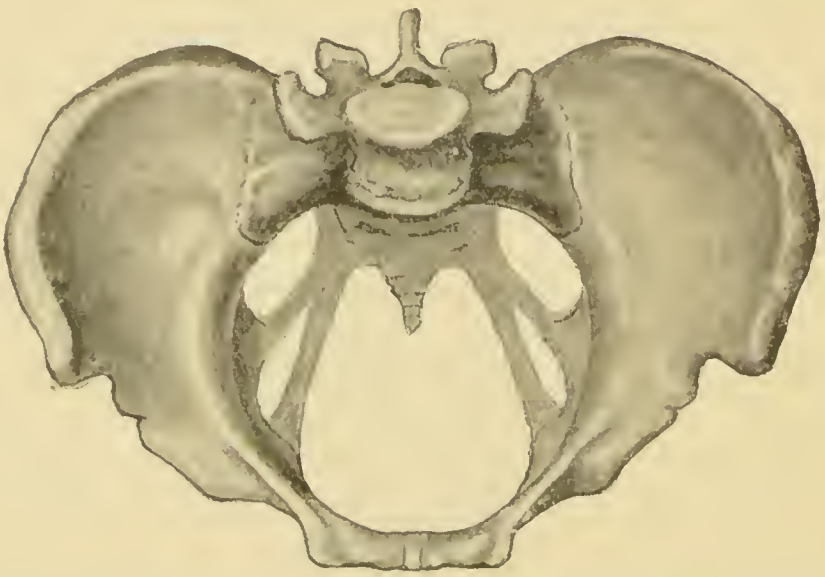

Fig. 21.—Pelvis as seen from above, to show the shape of the inlet or brim.

form a shallow, saucer-like hollow, while a deeper, narrower, and more cup-shaped space is enclosed by the other bones. The shallow upper hollow is called the "false pelvis," to distinguish it from the true pelvic cavity. The line dividing the false pelvis from the true is called the pelvic **brim.** It is a line running from the promontory of the sacrum along one wing of the sacrum to the sacro-iliac joint, and onwards along the ridge which forms the lower margin of the flat portion of the ilium. This ridge is called the ileo-pectineal line. The line of the brim continues along the upper margin of the pubic bone to the pubic symphysis, and back along the pubic bone of the other side, along the

ileo-pectineal line and the wing of the sacrum, back again to the promontory. The most prominent part of the ileo-pectineal line is called the ileo-pectineal eminence.

The curved ridge formed by the outer margin of the iliac bone is called the iliac crest, which is easily felt through the skin. It ends behind in the posterior

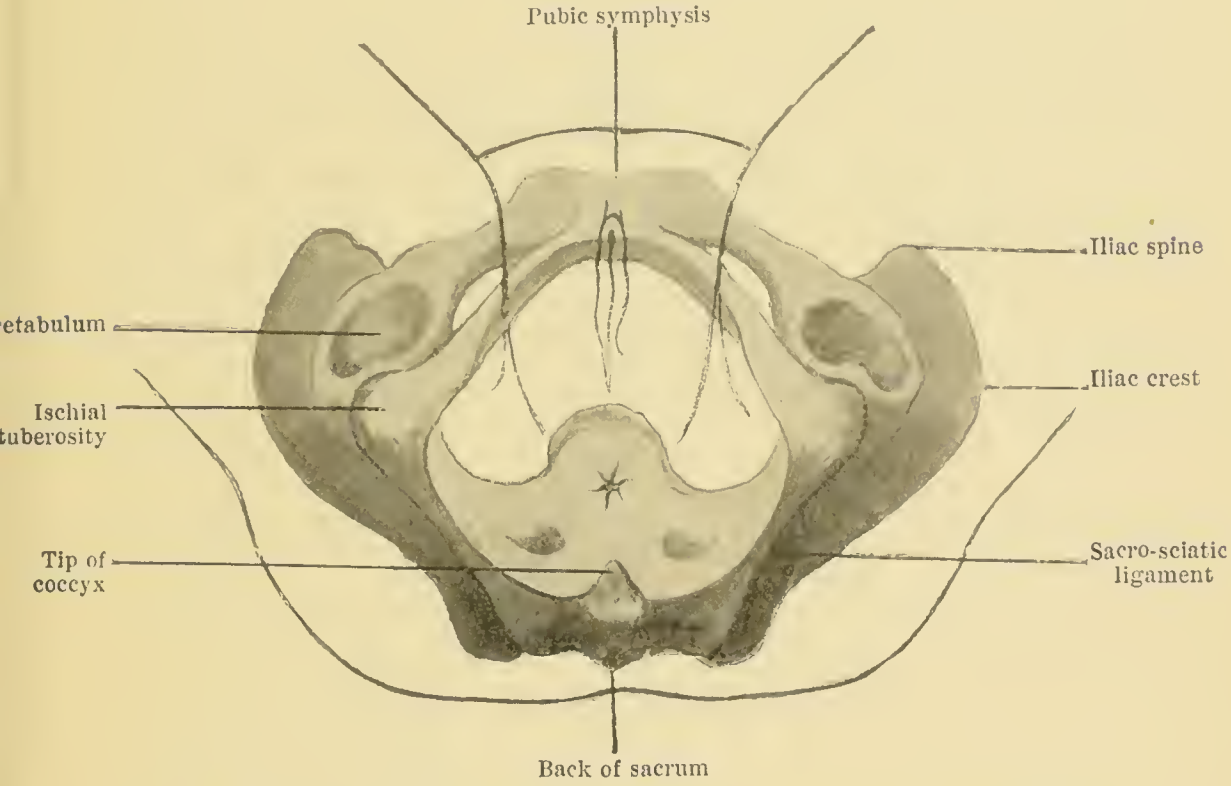

Fig. 22.—The pelvis as seen from below, showing the shape of the outlet. The outlines are added to show the position of the external parts in relation to the pelvic outlet. The patient is supposed to be lying on the back with the legs raised. Note the position of the vulva and the anus in relation to the pubic arch and the tip of the coccyx.

superior iliac spine, close to the sacro-iliac joint, a joint which is marked by a dimple in the living person. It ends in front in the anterior superior iliac spine, which can be felt in most people without difficulty.

The descending portions of the two pubic bones form an arch below the pubic symphysis which is called the *pubic arch.* The large bony bosses formed by the ischial bones are the ischial tuberosities, which support the weight of the body in the sitting posture.

The symphysis, the pubic arch, and the tuberosities can easily be felt in most persons, as also can the coccyx and the back of the sacrum. Strong bands of fibrous material run across the notch between the sacrum and the ischium on either side. The notch is called the sacro-sciatic notch, and the bands are called the sacro-sciatic ligaments.

The true pelvis is said to have an *inlet*, the brim, and

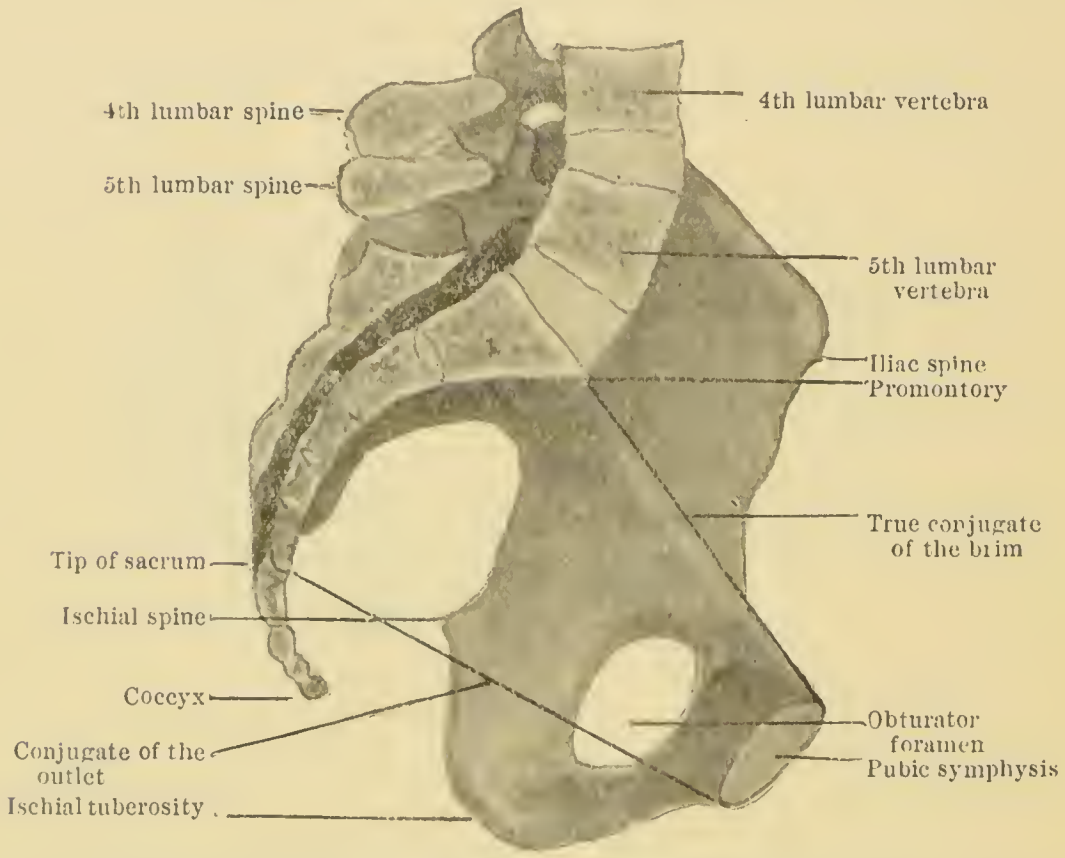

FIG. 23.—Left half of the pelvis as seen from the inner side. Showing the cavity of the pelvis between the conjugate of the brim and the conjugate of the outlet; note its long curved posterior wall, the front of the sacrum, and its short anterior wall, the back of the pubes.

an *outlet*, which is bounded by the pubic arch, the ischial tuberosities, the sacro-sciatic ligaments, and the tip of the sacrum. Between the inlet and the outlet is the cavity of the pelvis. This cavity thus has a long, curved back wall, the hollow of the sacrum. It has a short front wall, the pubic bones and pubic symphysis. The side walls are formed of the ischial bones and the descending portions of the pubes.

When a woman is standing up, the position of the pelvis is such that a line between anterior superior iliac spines passes directly over the symphysis. Thus if a pelvis be held up against a wall with both anterior spines and the pubic symphysis touching the wall, the pelvis is then in the position which it occupies in a woman standing erect. It may also be noticed that when the pelvis is in this position the notch in the lower margin of the acetabulum points straight downwards. In most persons the navel is

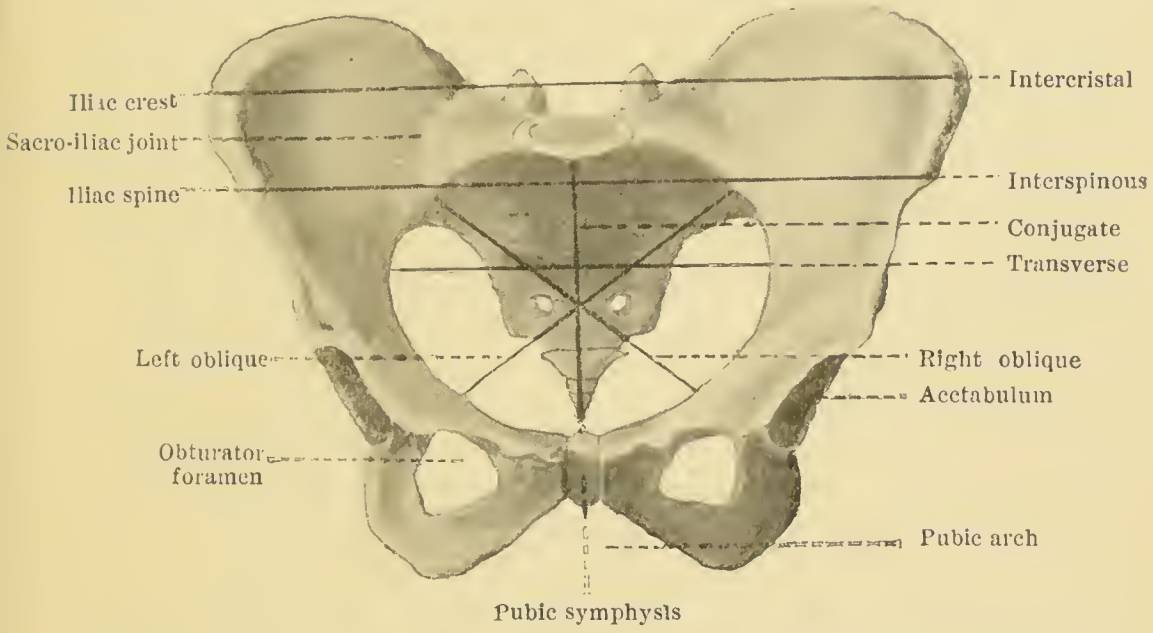

FIG. 24.—Pelvis as seen from the front. Showing the diameters of the false pelvis and those of the brim.

at the same level as the fourth lumbar vertebra; the promontory is thus about 2 inches below the navel.

Pelvic Measurements or Diameters.—The false pelvis has three important diameters or measurements.

The **interspinous** diameter is measured from one anterior superior iliac spine to the other. This diameter is about 10 inches.

The **intercristal** diameter is the distance between the iliac crests at the points where they are farthest apart. This is about 11 inches.

The **intertrochanteric** diameter is measured from one

great trochanter to the other, and their distance apart is about 12 inches.

The measurements of the true pelvis are still more important. At the brim of the pelvis, the distance from side to side is about 5 inches. This is called the **transverse** diameter of **the brim.**

The measurement from back to front at the brim is taken from the promontory of the sacrum to the upper margin of the pubic symphysis. This measurement is about 4 inches, and it is called the **true conjugate** diameter of the brim.

The **right oblique** diameter of the **brim** slants across the pelvis from the right sacro-iliac joint in a slanting direction to the most distant point on the left side of the brim, which is close to the ileo-pectineal eminence, while the **left oblique** is measured from the left sacro-iliac joint to the most distant point on the right side of the brim. These oblique diameters measure about $4\frac{1}{2}$ inches.

The second set of diameters is taken in the middle of, or half-way down the cavity of the pelvis. These diameters are named the transverse of the cavity, the conjugate of the cavity, and the obliques of the cavity. Each of them measures about $4\frac{1}{2}$ inches, as the pelvic cavity half-way down is nearly circular.

The third set of diameters is measured at the outlet. These are the **transverse** of the **outlet**, 4 inches, measured from one ischial tuberosity to the other, and the **conjugate** of the **outlet**, 5 inches, measured from the tip of the sacrum to the lower margin of the pubic symphysis. The tip of the coccyx is not used for this measurement, because it moves freely and is pushed back during labour.

The oblique diameters of the outlet are not important, as they cannot be measured from bone to bone, but only from the sacro-sciatic ligament of one side to the

pubic arch on the other. They measure about $4\frac{1}{2}$ inches.

Thus the pelvis at the brim is wider from side to side than it is from back to front, but at the outlet it is wider from back to front than it is from side to side. This is one of the most important facts in midwifery.

The diameters can be easily remembered if arranged as follows in the table :—

	Conjugate.	Oblique.	Transverse.
Brim or Inlet	4	$4\frac{1}{2}$	5
Cavity	$4\frac{1}{2}$	$4\frac{1}{2}$	$4\frac{1}{2}$
Outlet	5	$4\frac{1}{2}$	4

All the figures within the cross are $4\frac{1}{2}$, while at the corners the figures are 4, 5 and 5, 4.[1]

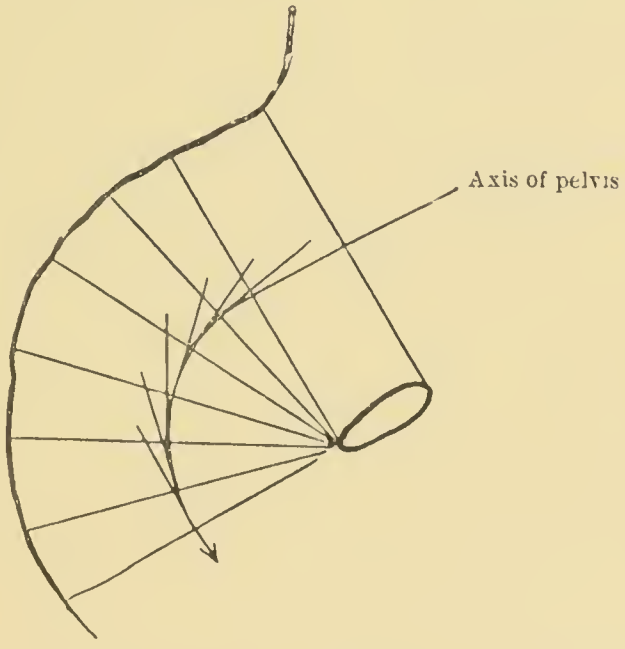

Fig. 25.—Diagram of the pelvic axis. The lines show the direction in which the centre of the child's head is supposed to move at different points on its way through the birth canal.

[1] These figures are often given $\frac{1}{4}$ inch larger ; but this makes them more difficult to remember and no more useful for practical purposes.

The **axis of the pelvis** is the line which passes through the centre of the pelvic canal from the brim through the cavity to the outlet. As the canal is curved, so the axis or line through its centre is a curved line. The centre of the child's head is supposed to travel along this line during labour.

By measuring the pelvis in the living patient, some idea may be formed of the shape and size of the brim, the cavity, and the outlet. This is no part of the work of midwives and nurses, but they should know how it is done. The external diameters are measured with large callipers. If the intercristal and interspinous diameters are small, but in proper proportion, this indicates that the transverse of the brim is narrow. The intertrochanteric diameter may also be too small. If the intercristal is not an inch larger than the interspinous diameter, the pelvis is probably "flat" and the true conjugate of the brim small. There are several ways of estimating this diameter. One tip of the callipers may be placed just below the spine of the fifth or last lumbar vertebra, which is about $1\frac{1}{2}$ inches above a line joining the two dimples which mark the position of the posterior superior iliac spines. The other tip is placed on the upper margin of the pubic symphysis. This measurement is called the **external conjugate.** It is found that the skin, flesh and bones behind and in front of the pelvic brim never measure less than $3\frac{1}{2}$ inches. Now suppose the external conjugate measures $7\frac{1}{2}$ inches, subtract $3\frac{1}{2}$ inches for the solid parts, and 4 inches is left for the true conjugate of the brim. Thus if the external conjugate is less than $7\frac{1}{2}$ inches, it follows that the true conjugate must be less than 4 inches, and is therefore smaller than it should be.

During vaginal examination it is sometimes possible, when the conjugate is small, to touch the promontory

Fig. 26.—Photograph of the back of a girl who had slight curvature of the spine, but whose pelvis was not deformed. The two dimples which mark the position of the posterior superior iliac spines are well seen ; also the spines of the lumbar vertebræ. The external conjugate is measured from the hollow below the 5th or last lumbar vertebra (which is about $1\frac{1}{2}$ inches above a line between the dimples) to the upper margin of the pubic symphysis.

of the sacrum with the tip of the second finger. It is then possible to mark, with the nail of a finger of the other hand, the point where the pubic arch touches the base of the first finger which is in the vagina. This gives the distance between the promontory and the lower margin of the pubic symphysis. This is called the **diagonal conjugate**. It is at least half an inch longer than the true conjugate, so if the diagonal con-

Fig. 27.—Measuring the diagonal conjugate with two fingers in the vagina. Whenever it is possible to feel the promontory in this way the conjugate of the brim is small. The diagonal conjugate is marked by the dotted line.

jugate measures less than $4\frac{1}{2}$ inches, the true conjugate must be too small.

In a thin woman who is not pregnant, the sacral promontory can be felt through the abdominal wall with the finger-tips. While they are touching the promontory, the palm of the hand can be brought down on to the pubic symphysis, and the point where this is felt can be marked with a finger of the other hand. There is now about as much flesh between the finger-tip and the promontory as there is between the marking finger and the symphysis, so the measurement should be 4 inches. If it is less than 4 inches, the true conjugate is small. The transverse of the outlet

can be directly measured between the ischial tuberosities, which should be 4 inches apart. The distance from the tip of the sacrum (not the coccyx) to the lower margin of the symphysis can also be directly measured and should be 5 inches.

If one side of the pelvis is contracted, the right and left great trochanters will not be at the same distance

Fig. 28.—Estimating the true conjugate externally in a thin woman who is not pregnant.

from the middle line of the body. These distances may be measured from the middle of the sacrum behind, and from the pubic symphysis in front.

The Passengers

The Fœtus or Child.—It is next necessary to study the child which has to pass through the mother's pelvic canal during labour.

A grown person can get his head through an opening which his shoulders and hips would not pass through. But the head of a new-born child is much larger, in proportion to its body, than that of an adult. A new-born baby is, in fact, like a cat, in so far as that its body can follow wherever its head can pass. Thus the important part of the fœtus in midwifery is its head.

Something must therefore be learnt about the **skull** or **cranium** of the fœtus.

The most important bones for the present purpose are seven in number, three pairs and one single bone. The two bones which form the forehead are the *Frontal* bones. Behind these are two large *Parietal* bones, and between these at the back is the single *Occipital* bone. Below the parietal bones, at the sides of the head in the ear region, are the two *Temporal* bones. Near the centre of each frontal bone is an elevation called the frontal eminence. In the centre of each parietal is a similar prominent boss called the parietal eminence, and near the centre of the occipital bone is a boss or elevation called the occipital protuberance. The growth of these bones begins at these central bosses at an early stage in the formation of the fœtus. The bones gradually enlarge till they meet one another at the edges and form a complete bony case for the brain by joining one another firmly.

At the time when a child is born this brain case is not quite complete, the bones do not quite meet one another so as to cover the whole surface, and their edges, where they do meet, are not firmly united. At the time of birth the head is thus somewhat soft, the bones can move one on another, and can overlap considerably. Thus the shape of the head can be altered greatly by the pressure of the sides of the pelvic canal during labour. This is called "head-moulding," and it will be considered later, but the way in which the head bones are connected must now be studied.

The lines along which the bones touch one another are called *sutures*, and these sutures have special names.

Between the frontal bones in the middle line of the head is the *Frontal* suture. Between the parietal bones, in the same line, is the *Sagittal* suture. Between the parietal bones and the frontal bones, running across the head, is

the *Coronal* suture. Between the occipital bone and the two parietal bones is a bent line with its corner or angle at the hinder end of the sagittal suture. This is called the *Lambdoidal* suture.

The bones do not touch each other along the whole length of these sutures. Thus at the corner where the coronal suture meets the sagittal suture there is a lozenge-shaped space where the bones do not meet and

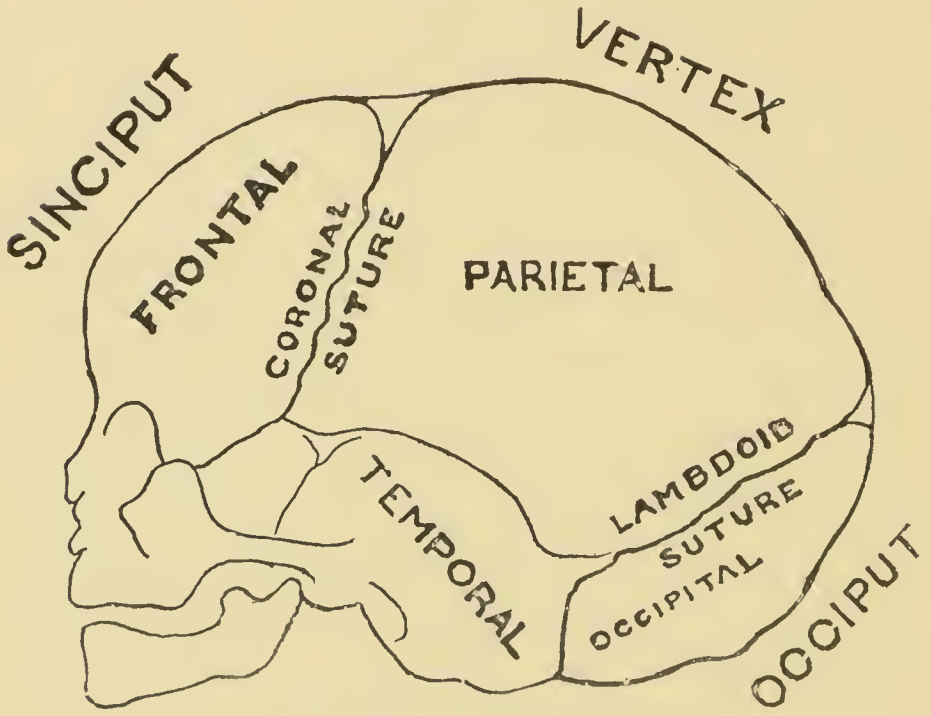

Fig. 29.—Fœtal skull, side view.

where the head is quite soft. This is called the anterior fontanelle or the *Bregma*. Behind this, where the sagittal suture meets the lambdoidal suture, the union of the bones is incomplete, and there is a three-cornered crack between the parietals and the occipital bone which is called the posterior fontanelle. The fontanelles gradually close after birth, and the bones become firmly united, so that the head gets harder day by day.

Regions of the Fœtal Head.—Certain portions or regions of the fœtal head are specially named for obstetric purposes. The forehead or brow is called the *sinciput*, the back of the head is called the *occiput*, and the top of

the head is called the *vertex*. The word vertex is strictly used to describe a point, namely the point at which a line drawn between the two parietal eminences crosses the sagittal suture. But the word is often used for that region on the top of the head which lies between the sinciput in front and the occiput behind, and which also

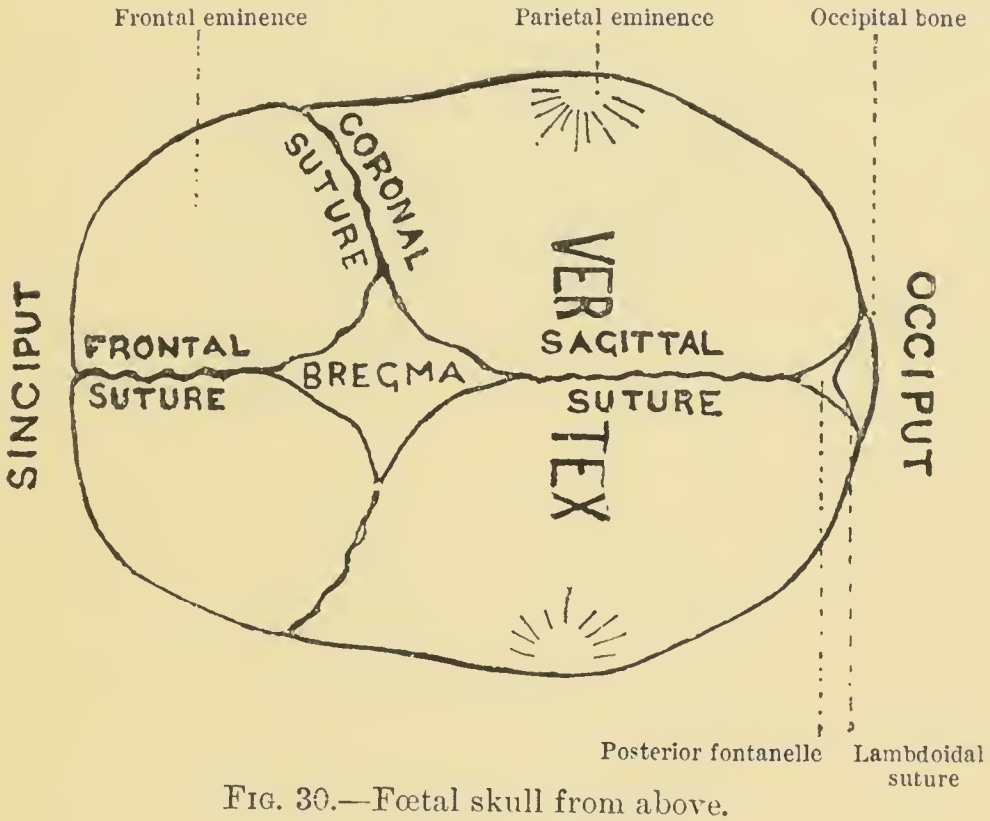

FIG. 30.—Fœtal skull from above.

has the anterior fontanelle in front of it and the posterior fontanelle behind it.

Measurements or Diameters of the Fœtal Head.—In order to compare the heads of different children, a set of definite measurements or diameters is used. The most important diameters are taken as follows.

The **occipito-mental** diameter extends from the tip of the occipital bone, that is from the posterior fontanelle, to the tip of the chin, and measures about 5 inches.

The measurement from the root of the nose (or glabella) to the occipital protuberance is about $4\frac{1}{2}$ inches, and is named the **occipito-frontal** diameter. From the

base of the occipital bone, where the child's head joins the neck, to the front of the bregma or anterior fontanelle measures about 4 inches and is called the **sub-occipito-bregmatic** diameter.

These are back to front measurements, and they are

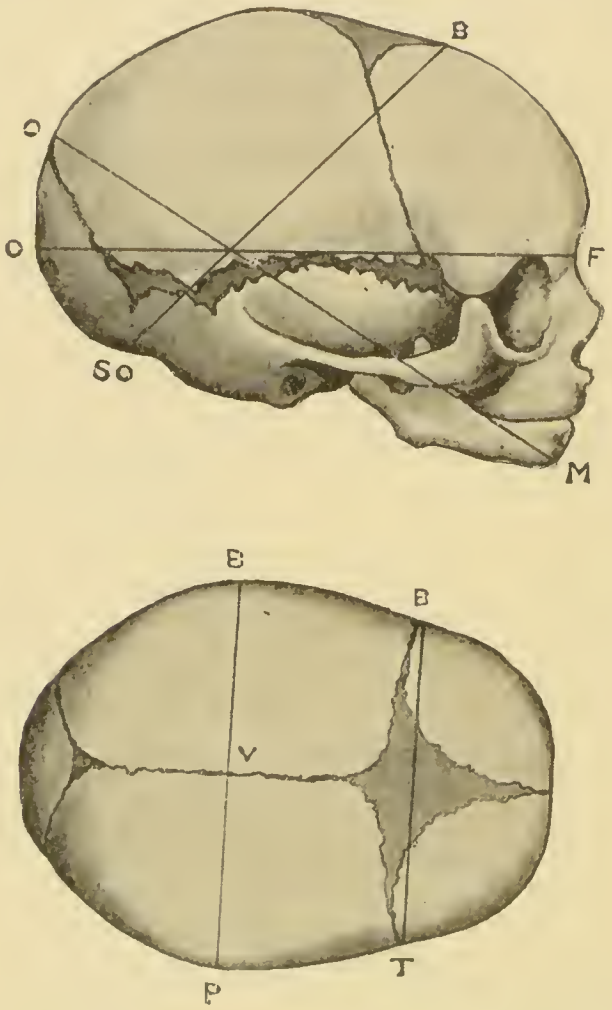

Fig. 31.—Diameters of the fœtal skull.

O.M. = occipito-mental diameter 5 inches.
O.F. = occipito-frontal diameter $4\frac{1}{2}$ inches.
S.O.B. = sub-occipito-bregmatic diameter 4 inches.
B.P. = bi-parietal diameter $3\frac{1}{2}$ inches.
B.T. = bi-temporal diameter 3 inches.
V. = vertex.

longer than the side to side measurements of the head. The distance between the parietal eminences is about $3\frac{1}{2}$ inches, and this is called the **bi-parietal** diameter; while the distance between the points which are farthest apart on the coronal suture is called the **bi-temporal** diameter

and measures about 3 inches. The above figures, which are sufficiently accurate for practical use, can be easily remembered if it is noted that each is ½ inch smaller than the last, and if they are arranged in the natural order thus :—

Occipito-mental diameter .	5 inches.
Occipito-frontal „ . .	4½ „
Sub-occipito-bregmatic diameter .	4 „
Bi-parietal „ .	3½ „
Bi-temporal „ .	3 „

The diameters must of course be measured with callipers or large compasses, but the shape and size of a child's head can be well noted by measuring three of its circumferences with a tape measure. The circumferences correspond to the diameters. Thus if the tape measure be passed round the child's head so as to lie over the tip of the chin and the posterior fontanelle, the measurement is called the occipito-mental circumference, which is about 15½ inches. The occipito-frontal circumference is about 14 and the sub-occipito-bregmatic about 12½ inches, but these measurements vary very considerably according to the shape of the child's head.

In the womb the child generally lies with its head bent on its breast, and the arms folded across the chest. The thighs lie against the abdomen, and the knees are bent so that the feet are well tucked up. The child in this attitude forms an oval, with the head at one end and the buttocks, or breech as it is called, at the other.

Liquor Amnii.—The membranes and the placenta together form a complete bag which lines the cavity of the uterus and contains the child and between one and two pints of the fluid called liquor amnii. The fluid is nearly all water, but contains a little salt. It

is pale in colour, unless it is stained by the dark tar-like matter from the child's bowels which is called *meconium*. The child's urine is added to the liquor amnii during the later weeks of pregnancy. Sometimes the quantity of liquor amnii is smaller than usual; in other cases it is increased so as to distend the uterus and interfere with labour—a condition called *hydramnios*.

Placenta, Membranes, Cord.—The placenta or after-birth is a flat, rounded structure, very much like a large tea-cake in shape and size, and weighs about one pound. It measures 7 or 8 inches across and is 1 or $1\frac{1}{2}$ inches thick in the middle, but is thinner at the edge, where the membranes are attached to it all round. That side of the placenta which is attached to the inside of the uterus is called the **maternal surface**, and the side next the child into which the cord is inserted is called the **fœtal surface**. The fœtal surface is covered by the inner of the two membranes, which, as before mentioned, is called the amnion. Through the amnion many blood-vessels can be seen running over the fœtal surface of the placenta. They take the blood brought by the cord to the different portions (lobes or cotyledons) of the placenta, and convey it back to the cord after it has passed through the small blood-vessels in the chorionic villi. The outer of the two membranes, the chorion, which is in contact with the uterine wall, is continuous with the maternal surface of the placenta. This surface is cut up by grooves into a number of lobes or cotyledons. Each lobe is a group or cluster of chorionic villi, supplied with blood by one of the vessels which run over the fœtal surface. The amnion is much thinner but much more tough than the chorion. The two membranes can be separated quite easily, and the amnion can be stripped off the fœtal surface of the placenta.

The placenta is usually placed in the upper or active

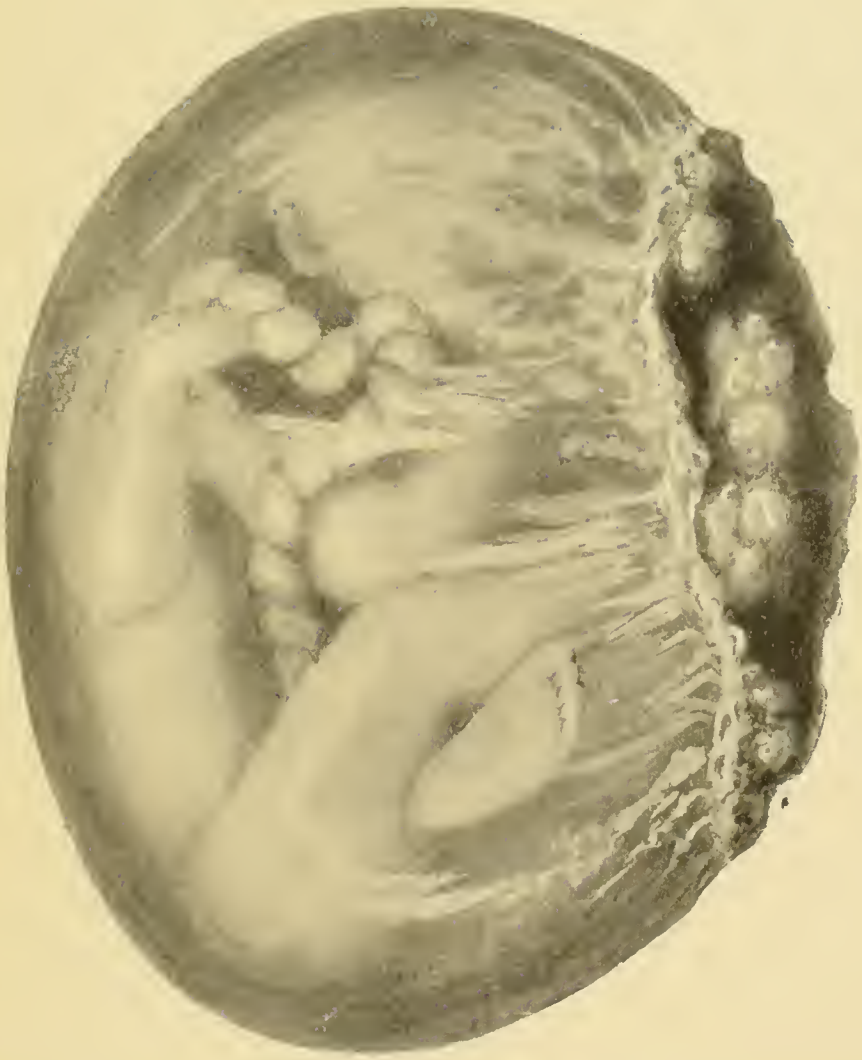

Fig. 32.—This is a drawing from nature of a $7\frac{1}{2}$ months child, delivered within the unbroken membranes by Dr Stallard of Manchester. The child's head and limbs and the cord can be seen through the membranes. The placenta is on the right, with some blood clot adhering to the maternal surface.

portion of the body of the uterus; but sometimes it is so low down that a portion of it is attached within the lower-uterine-segment, and may even extend over the os. A placenta, any part of which extends into the birth canal, is called a *placenta prævia*. The name *placenta succinturiata* is used when one or more small portions of the placenta are separated from the rest by a space across which blood-vessels run between the membranes. Such separated lobes of placenta are easily left in the uterus after labour, unless their presence is recognised. The discovery of a small hole in the membranes after the birth of the placenta always suggests this condition.

If the cord runs in at the edge of the placenta instead of near the middle of the fœtal surface, the placenta is called a "battledore placenta," and the cord is said to have a "marginal insertion." Occasionally the cord has a "velamentous insertion," being attached to the membranes instead of to the placenta. In these cases the blood-vessels run between the two membranes from the cord to the placenta and back: Children have occasionally bled to death through tearing of the blood-vessels in this unprotected situation.

The **umbilical cord** is about $\frac{1}{2}$ inch thick, and is generally from 18 to 24 inches long. It is twisted like a rope, is composed of a jelly-like substance, and has a smooth covering which is continuous with the amnion. It extends from the child's navel or umbilicus to the fœtal surface of the placenta, and contains the blood-vessels which carry the child's blood to the placenta and back again. There are three vessels: two arteries which take the blood to the placenta, and one vein which carries it back from the placenta after being supplied with oxygen from the mother's blood.

It was mentioned (page 27) that at first the whole surface of the ovum was covered with shaggy tufts called

chorionic villi, some of which grow into the uterine wall and fasten the ovum to it. It was also mentioned that toward the end of the third month the villi disappear from the greater part of the surface, leaving the chorion smooth, while at one place they grow rapidly and form the thick, rounded mass which later becomes the placenta.

When the child's blood has been pumped by the child's heart down the cord into the placenta, it passes through small blood-vessels in the chorionic villi, and so back to the child. There is no mixing of the child's blood with that of the mother, for the mother's blood remains in the spaces between the villi, which dip into it like the roots of a hyacinth into the water in which it is grown. The mother's blood is constantly running through the wall of the uterus into the spaces within the placenta, and back again through the walls of the uterus, and so through the veins to her heart and lungs. If the umbilical cord is cut without being tied first, the blood which escapes is not the mother's, but the child's blood, whether it comes from the placental end or the fœtal end of the cord. Again, all the blood that comes from the vagina is mother's blood, none of the child's blood can escape from the placenta. The child in the womb thus gets its oxygen from the air at second hand instead of breathing the air into its lungs. The mother's blood gets oxygen in her lungs, it then goes to the placenta and gives up some oxygen through the walls of the villi to the child's blood, which in turn goes back to the child's body through the cord. When the child is born and begins to breathe air with its own lungs, it stops sending its blood into the placenta, or, in other words, the circulation of blood in the placenta ceases.

Summary of Stages and Factors

First Stage.—Powers—The uterus.

Passages—Lower - uterine - segment and cervix.

Passenger—Fore-waters in bag of membranes and presenting part.

Second Stage.—Powers—The uterus and the accessory powers.

Passages—Soft parts : lower - uterine - segment, cervix and vagina. Hard parts : the bony pelvis.

Passenger—The child.

Third Stage.—Powers—Uterus and accessory powers.

Passages—Lower-uterine-segment, cervix, and vagina.

Passenger—Placenta and membranes.

THE MECHANICS OF LABOUR

Lie, Presentation, and Position

The words lie, position, and presentation have various meanings in ordinary language; but in midwifery they have very special meanings, which must be understood and remembered.

The "lie," the "presentation" and the "position" of the child can be learnt, near the end of pregnancy, by carefully feeling it with both hands through the abdominal wall.

In the womb the child usually has its head folded on its breast, the arms folded across the chest, the thighs bent up against its body, and the knees bent so that the feet are well tucked up. It is clear that the body of the child may lie either across or along the mother's body. Now the "*lie*" is *the relation of the long axis of the child to the long axis of the mother.* When the child's length is across the mother, the "lie" of the child is said to be "transverse" (or "cross-birth"). The "transverse lie" is easily recognised, because in it the uterus is broader than it is long, and the head of the child can be discovered by feeling one side or the other of the mother's abdomen. If, however, the "lie" is "lengthwise" or longitudinal, the child's length being up and down the mother's body, it is clear that either end of the child may be pointing downwards, and lying close to the mouth of the womb. By feeling carefully with both hands at the fundus and just above the pubes, it is possible to discover where the child's head is; in other words, to find which way up the child is lying. If the head is not felt at the fundus, it must be in the

pelvis or just above it, and the child will be born head first. On the other hand, if the head can be felt at the fundus, the breech must be in the pelvis or just above it, and the birth will be breech first.

Now the "*presentation*" means *the part of the child which is felt by the finger through the mouth of the womb during labour.* But the presentation can be fairly accurately discovered by examining the abdomen. For if the "lie" is transverse (cross-birth), one or other of the shoulders or part of the chest will be near the mouth of the womb, and will be the presenting part of the child. If the "lie" is lengthwise and the child's head is in the pelvis, some portion of the head must be the presenting part; in other words, the case must be one of the various head presentations. If the "lie" is lengthwise and the head is felt at the fundus, then some part of the breech or pelvic end of the child must be the presenting part, and the case is one of the breech or pelvic presentation.[1]

In the great majority of head presentations, the "vertex" is the part which presents at the mouth of the womb. The "occiput," the "brow," and the "face" are other head presentations. But the exact presentation can only be found out by vaginal examination. In most pelvic presentations the breech itself is felt through the os on vaginal examination, but sometimes it is a knee or a foot which actually presents.

The "position" of the child should also be learnt by feeling the abdomen—abdominal palpation, as it is called.

When a child is lying lengthwise in the mother's womb it may have its back towards the mother's back, or toward

[1] In head presentations the fœtal heart sounds are best heard about two inches below the umbilicus, and about two inches to the right or to the left, according to the "position." In pelvic presentations the heart sounds are best heard at about the same distance above the umbilicus and on one side or the other, according to the position. In posterior positions, the child's back being towards the mother's back, it is often difficult or impossible to hear the heart sounds.

the mother's front, and again, its back may be to one side or to the other side of the mother. If the child's back is to the mother's front, it can be felt smooth and firm, not in the middle, but to one side or other of the mother's abdomen. Thus the back is found to the front and left or to the front and right of the mother.

Sometimes the back cannot be felt, but the limbs of the child can be recognised to one side or the other of the mother's abdomen. If the limbs are in front and on the left, the back of the child must be behind and to the right of the mother; while if the limbs are felt in front and to the right, the back must be behind and to the left. The word "*position*" means, in midwifery, *the position of the presenting part of the child, relative to the pelvis of the mother.* The child is generally found in one of four positions. They are named, in ordinary cases in which the vertex presents, by the position of the back of the head—the occiput :—

1. Back of the head to the left and front—left occipito-anterior—L.O.A.
2. Back of the head to right and front—right occipito-anterior—R.O.A.
3. Back of the head to right and behind—right occipito-posterior—R.O.P.
4. Back of the head to left and behind—left occipito-posterior—L.O.P.

These positions are known for shortness either by the numbers,—first position, and so on,—or by the initials of their names,—L.O.A., and so on.

The first position, or L.O.A., is the commonest, the next in frequency is the third or R.O.P.

There are four positions also in cases of pelvic presentation, and these are named by the position of the child's sacrum (see page 95).

Mechanism of Labour in Cases of Vertex Presentation

In cows and horses, cats and dogs, as in all the lower animals, the pelvic canal is straight throughout, as the backbone runs straight down to the tail. This is one reason why labour is so much easier in the lower animals than it is in women. The human pelvis, owing to its shape, presents two mechanical obstacles to the passage of the child's head. First it is curved; the hollow of the sacrum forming a long curve behind, while in front the public symphysis presents a corner round which the head has to pass. Secondly, the entrance to the pelvic cavity is wide from side to side and narrow from back to front, while the outlet of the pelvis is narrower from side to side than it is from back to front.

For these reasons the child's head cannot pass straight through the human pelvis, but as it descends it has to make some other movements apart from its descent or downward progress, by which its shape is accommodated or fitted to the shape of the canal through which it is passing. These movements are called the Mechanism of Labour. In ordinary vertex presentations four movements are usually described and they must be remembered. Their names are :—

1. *Flexion.*
2. *Internal Rotation.*
3. *Extension.*
4. *External Rotation.*

These occur one after another, together with the general movement of *Descent* which goes on all the time.

Flexion.—The head enters the pelvis with the vertex leading or presenting in the left occipito-anterior position, so that the occipito-frontal diameter of the head is applied

to the oblique diameter of the pelvic brim. Each of these is about 4½ inches, so the fit is tight. But the sub-occipito-bregmatic diameter of the head is only 4 inches. So the position of the head alters in such a way that the smaller or sub-occipito-bregmatic diameter is applied to the brim. Then the fit is easier, and thus the descent of the head is favoured. In this movement of the head the back of the head descends more quickly than the front, so

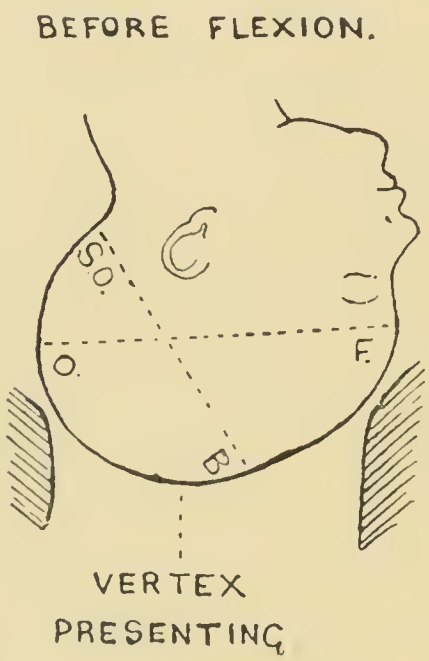

Fig. 33.—The head above the brim before flexion.

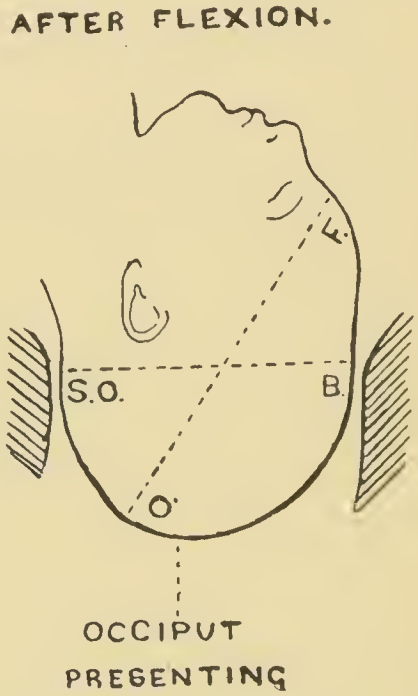

Fig. 34.—The head "engaged" in the pelvis after flexion.

that the vertex is no longer the presenting or leading part, but is replaced by the occiput.

At the beginning of labour the examining finger feels the vertex in the middle of the dilating os, and can reach both the anterior fontanelle and the posterior; but a little later, as flexion occurs, the vertex moves away, the anterior fontanelle passes out of reach and the posterior fontanelle is felt in the middle of the os; in other words, the occiput presents instead of the vertex.

Flexion therefore should be described as *a movement by which the occiput descends and replaces the vertex as the presenting part.*

A hat which is too small to go on the top of a man's head will admit the back of his head. The top of the child's head may be too large to go into the pelvis when the back of the head will enter it easily.

Internal Rotation.—The front portion of the floor of the pelvis, it will be remembered, is pulled up during labour, and the back half (rectum, the perineum, and the muscular and other structures attached to the coccyx) is pushed down during labour, and forms the lower portion of the long, curved, posterior wall of the birth canal.

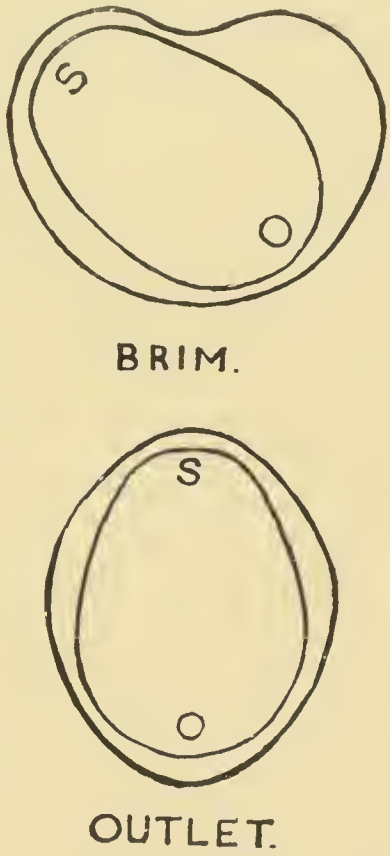

Fig. 35.—Internal rotation, in which the occiput moves forward through one-eighth of a circle. Occiput = O. Sinciput = S.

As the head descends through the pelvis, the occiput, which is leading (flexion having already occurred), strikes the curved floor of the pelvis. It cannot then go straight on, but is turned forward.

The outlet of the pelvis is narrower from side to side than from back to front. The long diameter of the outlet runs fore and aft. The child's head also measures more from back to front than from side to side. So that to escape easily, the long axis of the child's head must lie in the long diameter of the outlet and not across it. The forward movement of the occiput in internal rotation brings this about, so that this movement allows the escape of the head from the outlet of the bony pelvis. It is a forward movement of the occiput through one-eighth of a circle from the side of the pelvis to the front. It occurs when the occiput descends far enough to strike the pelvic floor. It is called internal,

because it occurs inside the pelvis, whereas external rotation occurs after the head is outside the pelvis.

Internal Rotation is a movement in which the *leading part of the child is turned forward from the side to the front of the pelvis* when it strikes the curved posterior wall of the birth canal.

Extension.—This movement is the unbending of the

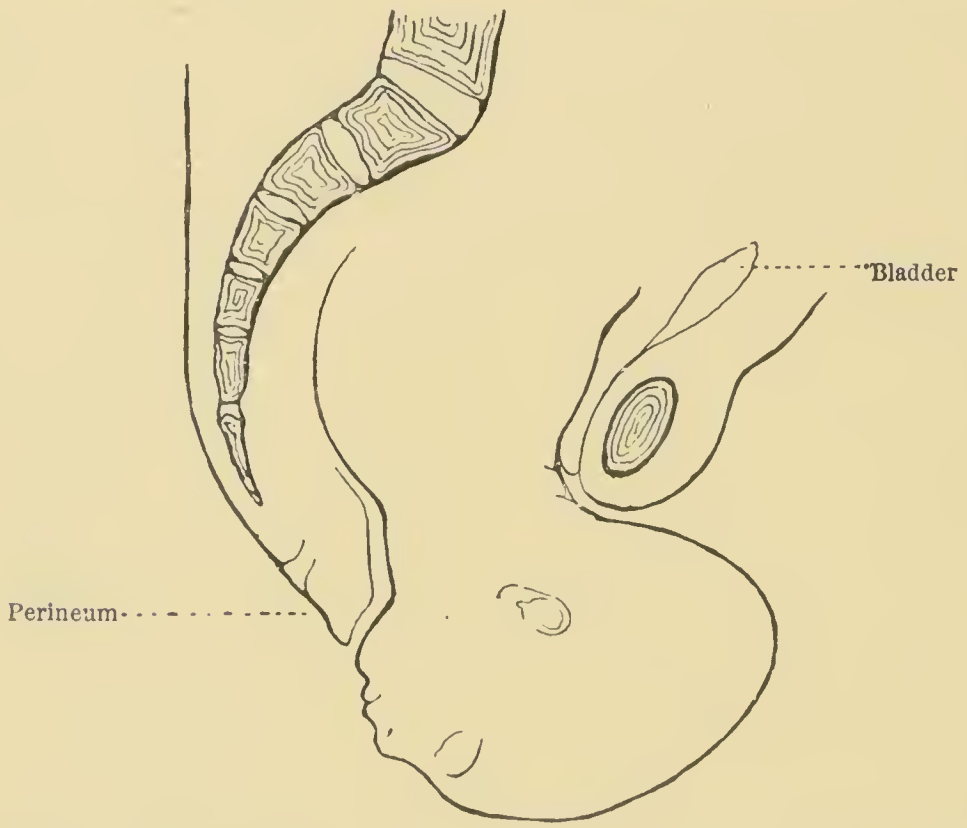

Fig. 36.—Extension of the head. The back of the neck under the pubic arch. The face has just passed over the perineum.

head which occurs just as the head is born. After the back of the head has escaped from the vulva, the face passes over the mother's perineum and the chin of the child leaves its chest.

External Rotation.—After the head is born it is seen to rotate, so that the occiput turns again, towards the left as a rule. The cause of this movement is as follows. While the head is being born the child's shoulders enter the pelvis, one to the right and one to the left, the broad measurement of the shoulders falling into the large

transverse diameter of the brim. But to leave the pelvis the shoulders must rotate, just as the head did. The leading shoulder is pushed to the front by the back wall of the pelvis, just as the occiput was. Thus the broad measurement of the shoulders comes to lie in the long diameter of the outlet, one shoulder in front, the other behind. This internal rotation of the shoulders moves the head round, so *external rotation of the head really means internal rotation of the shoulders.*

The mechanism described above is that which occurs in a case of vertex presentation and the left occipito-anterior position. But the movements are exactly the same in the rare right occipito-anterior cases, only that rotation is from the right side to the front, instead of from the left.

In the third and fourth—namely the **occipito-posterior positions**—there is an important difference in the mechanism, or rather in the two mechanisms, either of which may occur.

Take the right occipito-posterior (third or R.O.P) position, which is the commoner of the two.

The head descends with the occiput to the back and to the right side of the pelvis, the vertex presenting in the centre of the pelvic canal. Now one of two things may occur.

First. The occiput may rotate through three-eighths of a circle right round to the pubic symphysis, so bringing the head into the same position which it occupies in an ordinary (occipito-anterior) case. This is called Long Internal Rotation, because the occiput moves through three-eighths of a circle instead of through one-eighth. When long rotation occurs, the labour ends in the usual way after some delay. The occiput escapes at the vulva, extension, external rotation and the birth of the body following in due course.

Second. Instead of the occiput coming forward, the sinciput may come to the front.

The front of the child's head is, to begin with, to the left and front of the pelvis. Sometimes it descends too quickly, strikes the pelvic floor before the occiput, and is rotated forward through one-eighth of a circle, coming to

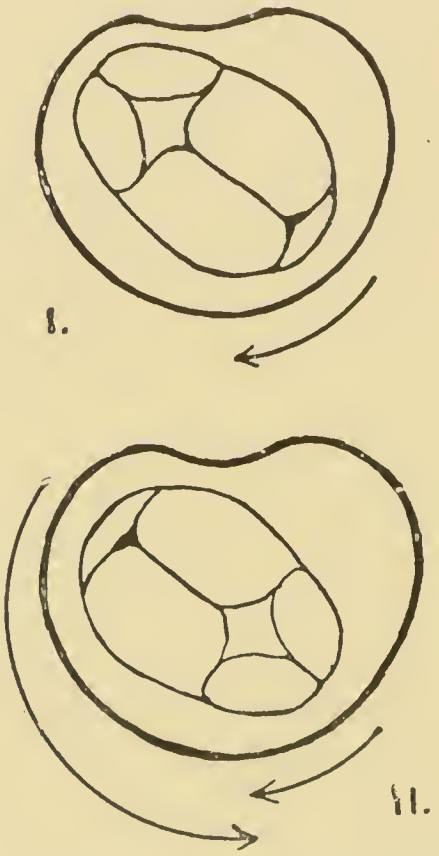

Fig. 37.—Diagram to show the difference between occipito-anterior and occipito-posterior positions as regards internal rotation.

I. Occipito-anterior—occiput rotates to the front through $\frac{1}{8}$ circle.
II. Occipito-posterior—occiput rotates to front through $\frac{3}{8}$ circle, or else sinciput rotates to front through $\frac{1}{8}$ circle, giving a persistent occipito-posterior case.

the pubic symphysis, while the occiput of course passes back into the hollow of the sacrum.

When this short rotation occurs, the back of the head remains in the back of the pelvis, and instead of becoming an ordinary case, the case becomes what is called a **persistent occipito-posterior** case.

Now labour with the occiput remaining to the back

does not end nearly so easily as when the occiput is to the front, for a larger diameter of the head is presented to the outlet of the pelvis and to the vaginal opening. Therefore the short rotation in an occipito-posterior case is called a mal-rotation. In these cases labour is much prolonged, interference is often required, and the perineum is generally torn. The region of the bregma escapes first, and instead of extension at this point, flexion of the head occurs as the occiput passes over the perineum. External rotation occurs to one side or the other as the leading shoulder is moved forward towards the pubic arch.

A good midwife or nurse can generally find out when this mal-rotation has occurred by abdominal palpation. An occipito-posterior case is recognised early in labour by feeling the limbs of the child to one side and in front of the mother's abdomen. If the long rotation occurs as the occiput comes forward, the limbs disappear and are replaced by the back. But if the limbs remain palpable in front of the abdomen as labour goes on, then it is to be concluded that the sinciput has come to the front and that the case is a persistent occipito-posterior case.

Summary of Mechanism in Vertex Presentations

I. Left Occipito-anterior. First position or L.O.A. The most common position. Three or four times more common than R.O.P.

1. **Flexion.** Occiput dips.
2. **Internal Rotation.** Occiput comes to front through $\frac{1}{8}$ circle from left.
3. **Extension.** At birth of head.
4. **External rotation.** Occiput to left.

II. Right Occipito-anterior. Second position or R.O.A. Very rare.

Same as L.O.A. above; but read "right" for "left."

III. Right Occipito-Posterior. Third position or R.O.P. Occurs once in every four or five cases. Two mechanisms.

Most frequently—

1. **Flexion.** Occiput dips.
2. **Long internal rotation** of occiput forward through $\frac{3}{8}$ circle from right.
3. **Extension.**
4. **External rotation.** Occiput to right in restitution.

Less frequently—malrotated or persistent occipito-posterior.

1. **Extension.** Sinciput dips.
2. **Short rotation** of sinciput forward through $\frac{1}{8}$ circle from left.
3. **Flexion.** Occiput passes over perineum.
4. **External rotation** in either direction.

IV. Left Occipito-Posterior. Fourth position or L.O.P. Very rare. Two mechanisms.

Same as R.O.P. above; but read "left" for "right" and "right" for "left."

Head-Marking and Head-Moulding

During labour the child is under considerable pressure, as the force which opens the mouth of the womb and expels the child must act on its body. One part of the child's surface is less pressed upon than the rest, namely that part which is at the mouth of the womb; in other words, the presenting part. The effect of this is to cause a considerable swelling in that part of the child which is encircled by the os during labour.

In a head presentation the vertex is the first part to present, and during early labour a swelling forms over the vertex. This swelling is called the primary **caput succedaneum**.

But the presentation changes as labour goes on. Flexion occurs, the occiput dips and becomes the presenting part, and thus takes the place of the vertex. During the whole of labour, after flexion has occurred, it is the occiput which is exposed to less pressure than the other parts of the child, and on it a swelling forms which is

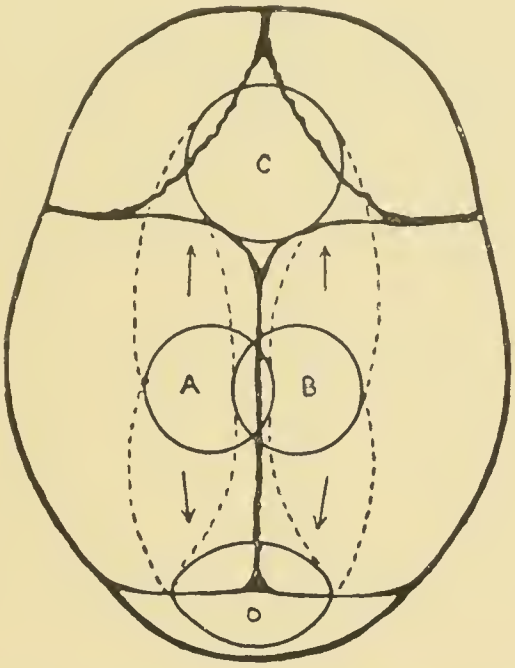

Fig. 38.—Diagram of various positions of the caput succedaneum.

A and B are the positions of the primary caput, according as the left or the right parietal is anterior at the beginning of labour.

D is the position of the secondary caput in all cases where the occiput has rotated to the front.

C is the position of the caput in malrotated occipito-posterior cases, *i.e.* where the sinciput has rotated to the front. (This must not be confused with the caput in face cases.)

larger in every way than that formed at the vertex during the short time before flexion occurred, and when the encircling os was smaller in size. The swelling on the occiput is called the secondary caput succedaneum.

In occipito-posterior cases the primary caput is at the vertex. If long rotation occurs, the secondary caput is at the occiput. But if mal-rotation occurs, it is the region of the bregma which is exposed to reduced

pressure for the rest of the labour, and thus the secondary caput forms over the bregma.

In all kinds of presentations the swelling or caput forms over the presenting part. In breech cases it is over part of the child's pelvis. In transverse cases it is on a shoulder, or it may include a whole arm. In face cases it is on the face, and so on. The swelling is purplish and discoloured like a bruise, but it quickly disappears after labour is over, for then the pressure of the air is equal all over the surface of the child.

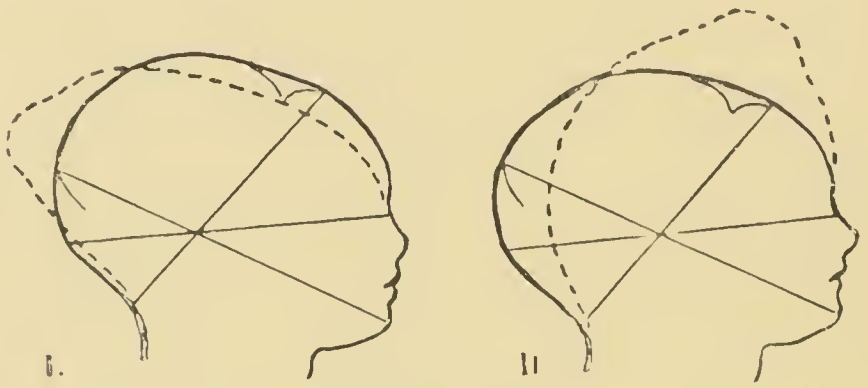

Fig. 39.—Diagram of head moulding and caput.

I. Ordinary case. II. Persistent occipito-posterior.

The plain line gives the unmoulded form of the head. The O.M., the O.F., and the S.O.B. diameters are shown, also the bregma and the tip of the occiput. The dotted line shows the moulding and the position of the caput in each case.

The pressure of the pelvic canal on the bones of the head causes alterations in the shape of the head which vary according to the mechanism of labour. This is called head-moulding. The bones are not complete at the time of birth. The sutures are wide, and the fontanelles are large. Under side pressure, the edges of the parietal and frontal bones on one side will slip under the edges of the corresponding bones on the other side. Under back and front pressure, the edges of the two frontals will slip a long way under the edges of the two parietals, and the edge of the occipital bone will also slip

under the two parietals behind. This moulding often allows a child to be born alive which could not otherwise escape from its mother's pelvis. The soft head gradually moulds itself to the shape of the pelvis, and then slips through uninjured. A hard head will not mould, so after prolonged delay one or other of the bones may be broken, or the head may be fatally injured during instrumental delivery. Many a child loses its life in birth, because its head is harder, more firmly ossified than usual, more like that of a child three or four weeks old. Premature children's heads are softer than those at full time, being younger, and the bones being less ossified, or hardened by growth.

In ordinary labour the head is elongated and narrowed. In occipito-posterior cases the head is heightened, and in face and brow cases it is also deformed according to the mechanism.

These alterations of head-moulding pass away in a few days after birth, but it is often necessary to explain them and the caput to anxious parents who are not familiar with the strange appearance of the new-born.

Position, Presentation, and Mechanism in Breech Cases

In cases of breech presentation, four positions are named according to the position of the child's sacrum relative to the mother's pelvis :—

1. Sacrum to left and front—left sacro-anterior—L.S.A.
2. Sacrum to right and front—right sacro-anterior—R.S.A.
3. Sacrum to right and back—right sacro-posterior—R.S.P.
4. Sacrum to left and back—left sacro-posterior—L.S.P.

The presentation may be the breech itself, a foot (footling), or a knee. The part encircled by the os becomes swelled and purple during labour, just as the

part of the head which presents is marked by the caput succedaneum. The mechanism in breech cases is as follows. The child's hips enter the pelvis one on each side, so that the broad diameter of the child's pelvis is in one of the oblique diameters of the brim. But as the breech descends, one of the child's hips is rotated to the front and the other passes back, so that the child's pelvis escapes from the mother's pelvis with its broad side-to-side diameter in the long back-to-front diameter or conjugate of the mother's pelvic outlet.

The body is thus born with its front to one side and its back to the other side of the mother, and the shoulders escape from the pelvic outlet, one in front under the pubic arch and the other behind over the perineum. The broader or side-to-side diameter of the child's chest thus fits into the greatest diameter of the outlet, namely the conjugate.

The head—it is called the after-coming head in breech cases—enters the mother's pelvis flexed, and in one of the oblique diameters of the brim, just as in head-first labour. And again, as the head descends through the pelvis, a rotation occurs, so as to bring the long diameter of the child's head into the conjugate or long diameter of the pelvic outlet. The important point is that the back of the child's head comes to the front of the mother, while the child's face passes into the hollow of the sacrum. The child's chin escapes first, and its face then passes over the perineum, the back of the head being born last.

If this mechanism is interfered with, the arms getting up beside the head, the head becoming extended instead of flexed, or, especially, the child's face coming to the mother's front, difficulties in the birth of the head are unavoidable.

Fig. 40.—Section of a woman who died before labour. Breech presentation in a x-para at full time (Waldeyer). The cervical canal is complete and undilated. There is no retraction ring and no thinning of the lower uterine segment. The bladder is in the pelvis.

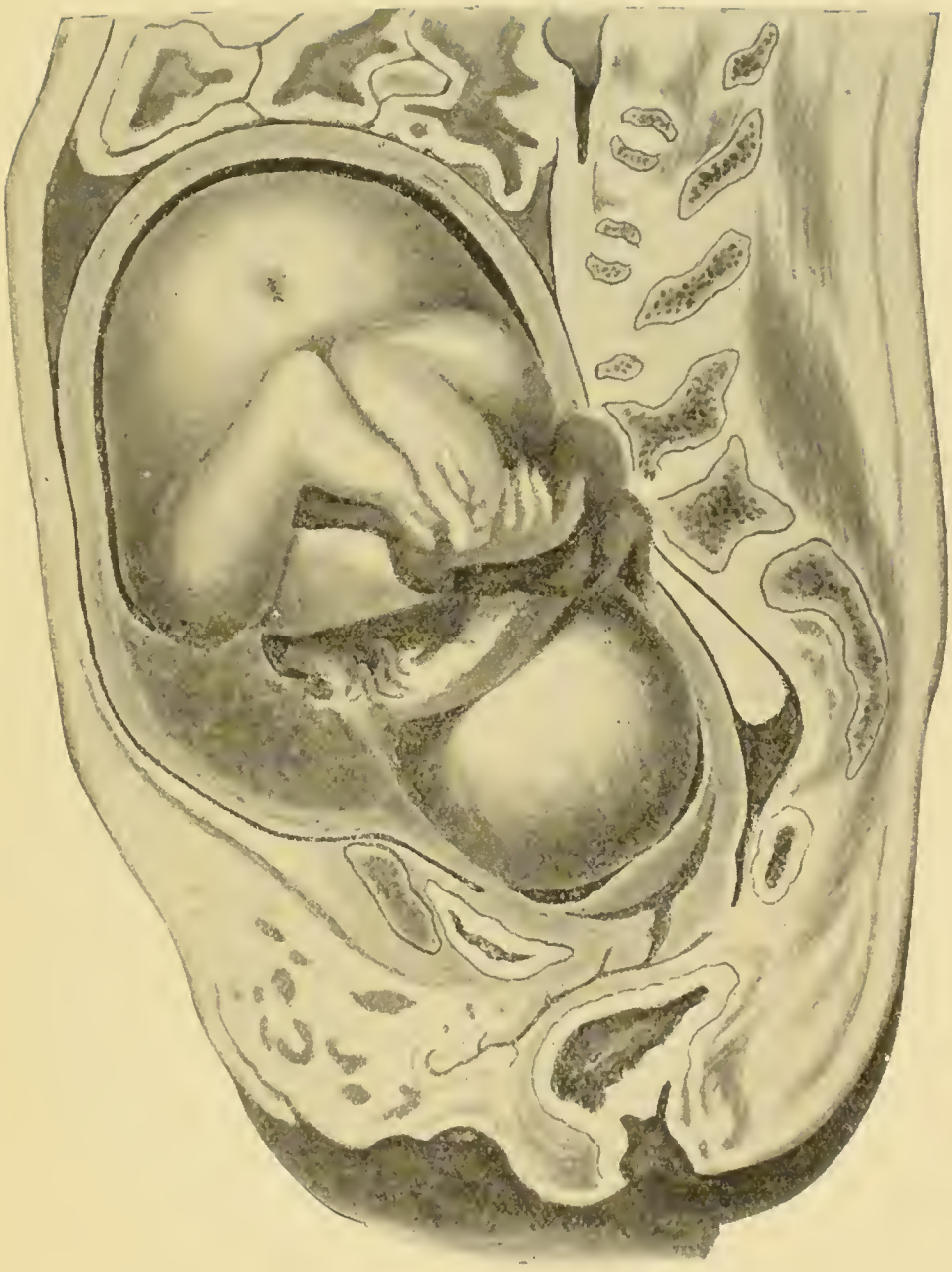

Fig. 41.—Section of a woman early in the first stage of labour (Winter). A ii-para who died of eclampsia at full time. Head presentation. The os internum is opened; the membranes are partly separated from lower-segment; the bladder is in the pelvis; partial placenta prævia, its lower part compressed by fœtal head, which is fully flexed. Note the flexed fœtal attitude, and short distance from head to breech.

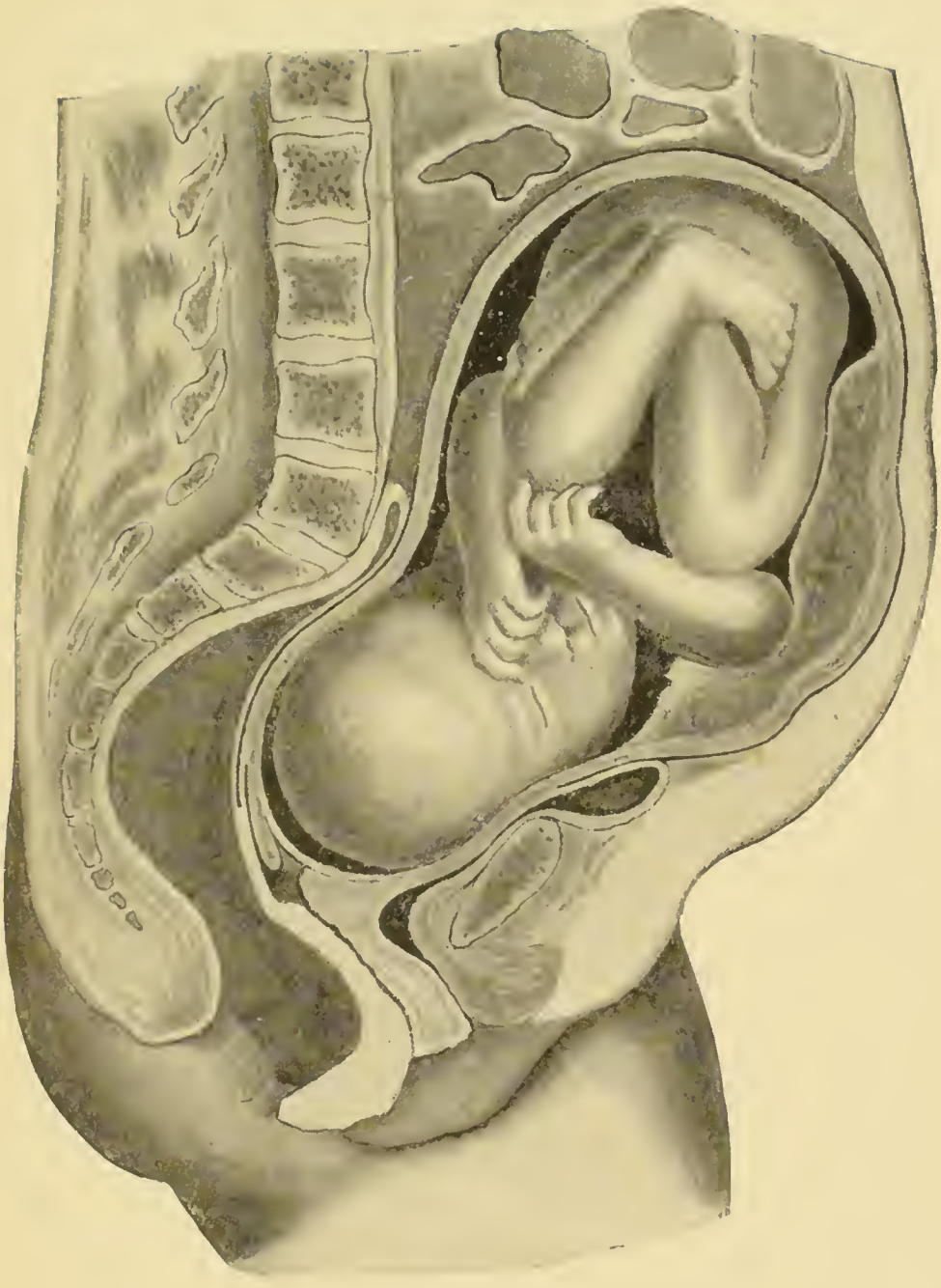

Fig. 42.—Section of a i-para who died during the first stage of labour at the eighth month (Saexinger). The cervix is partly dilated and the os internum has disappeared. The lower uterine segment is thinned, but no retraction ring is formed. The placenta is on the anterior wall. The bladder is partly drawn up into the abdomen. Note that the fœtus is less flexed than that in Fig. 41, and that the distance from head to breech is increased.

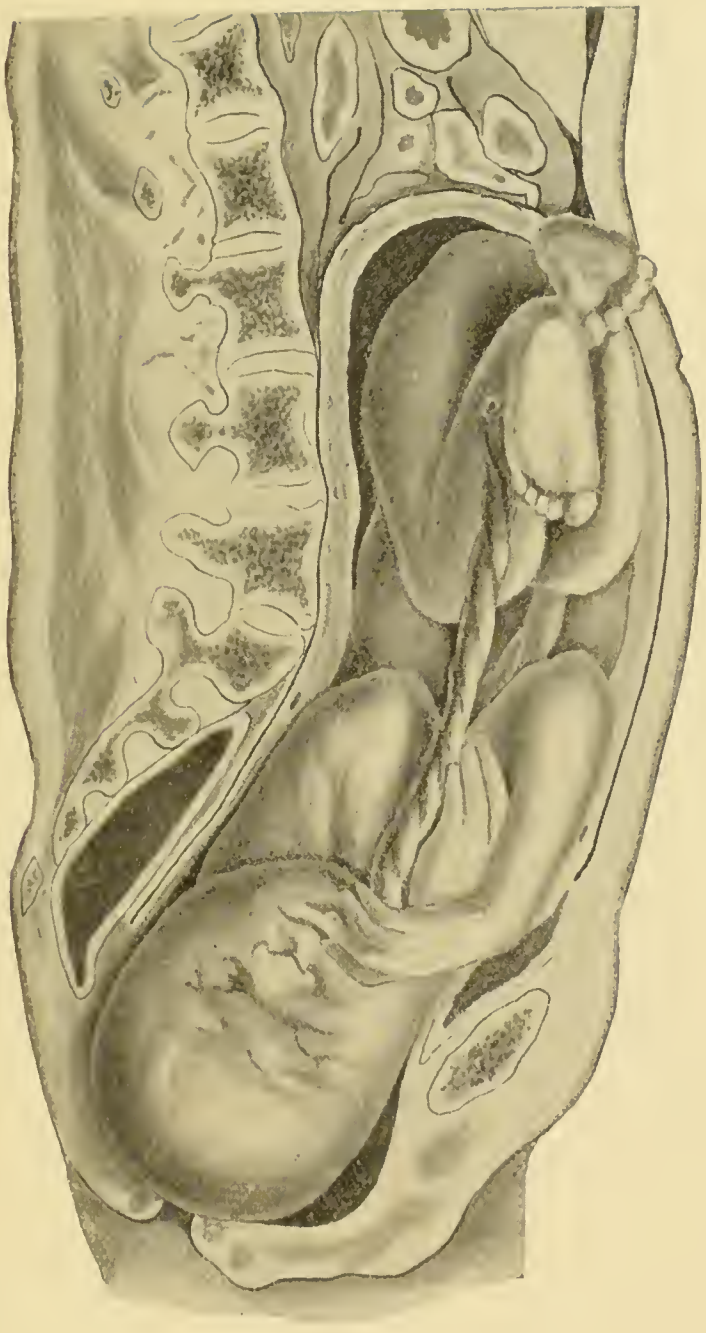

Fig. 43.—Section of a i-para who died near the end of the second stage of labour (Chiari). The whole birth canal is dilated, except the vaginal opening. The head has descended to the perineum. The retraction ring is seen in front and behind. The bladder is drawn up into the abdomen. The fœtus is straightened out, and the distance from the head to the breech is much increased, while the width of the uterus is much lessened. The fundus is still as high as at the beginning of labour.

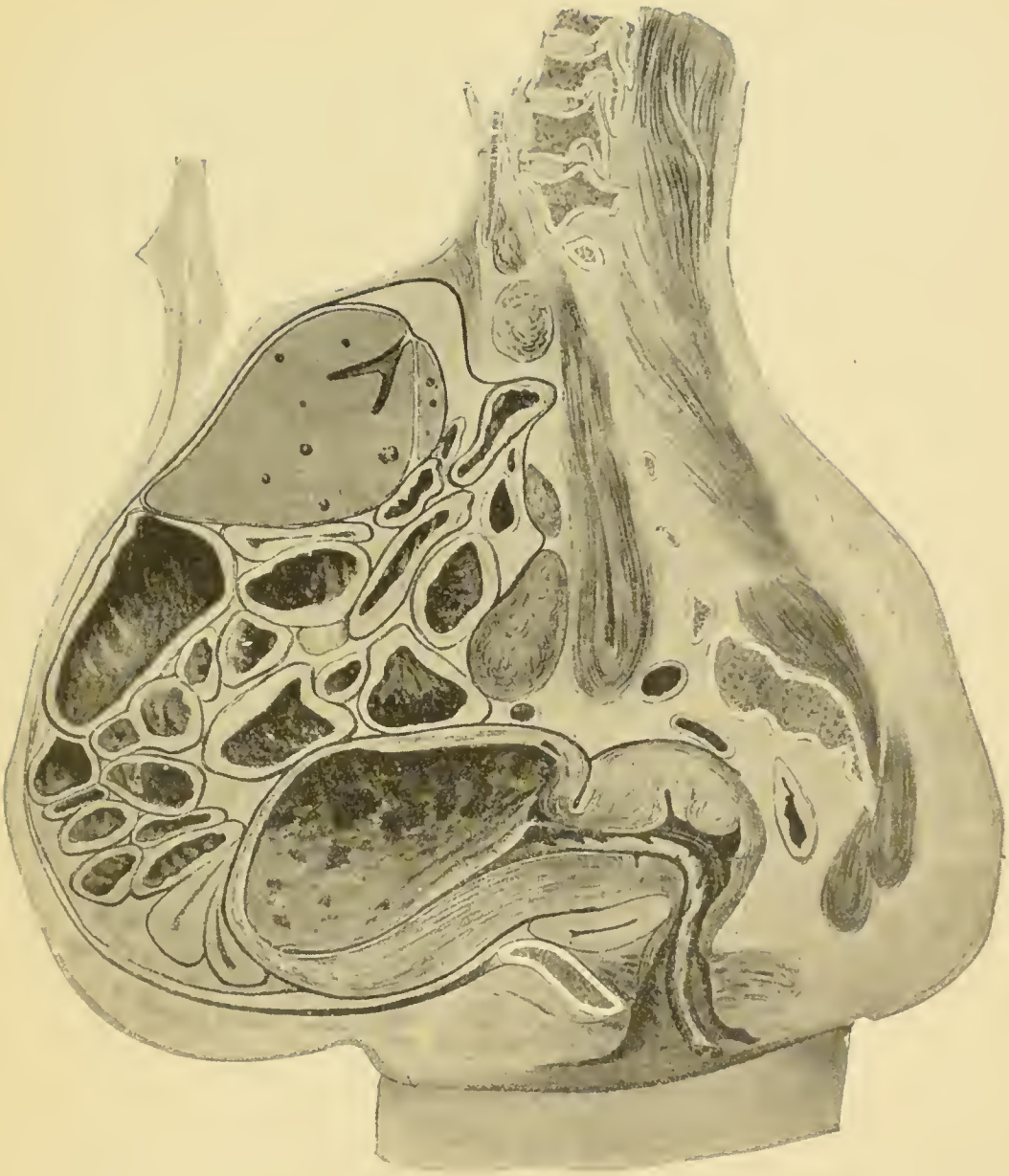

Fig. 44.—Section of a woman who died at the beginning of the third stage (Pestalozza). The placenta is in the active part of the body of the uterus and separation has not begun. There is no empty space in uterus. The membranes are detached from the lower-uterine-segment. The anteflexion of the uterus and the outline of the abdomen are due to the subject having been frozen in the erect posture. The other sections have been frozen on the back. The wall of the uterus is still thin where the placenta is attached. The rest of the uterine wall above the retraction ring is thick. The bladder is in the pelvis.

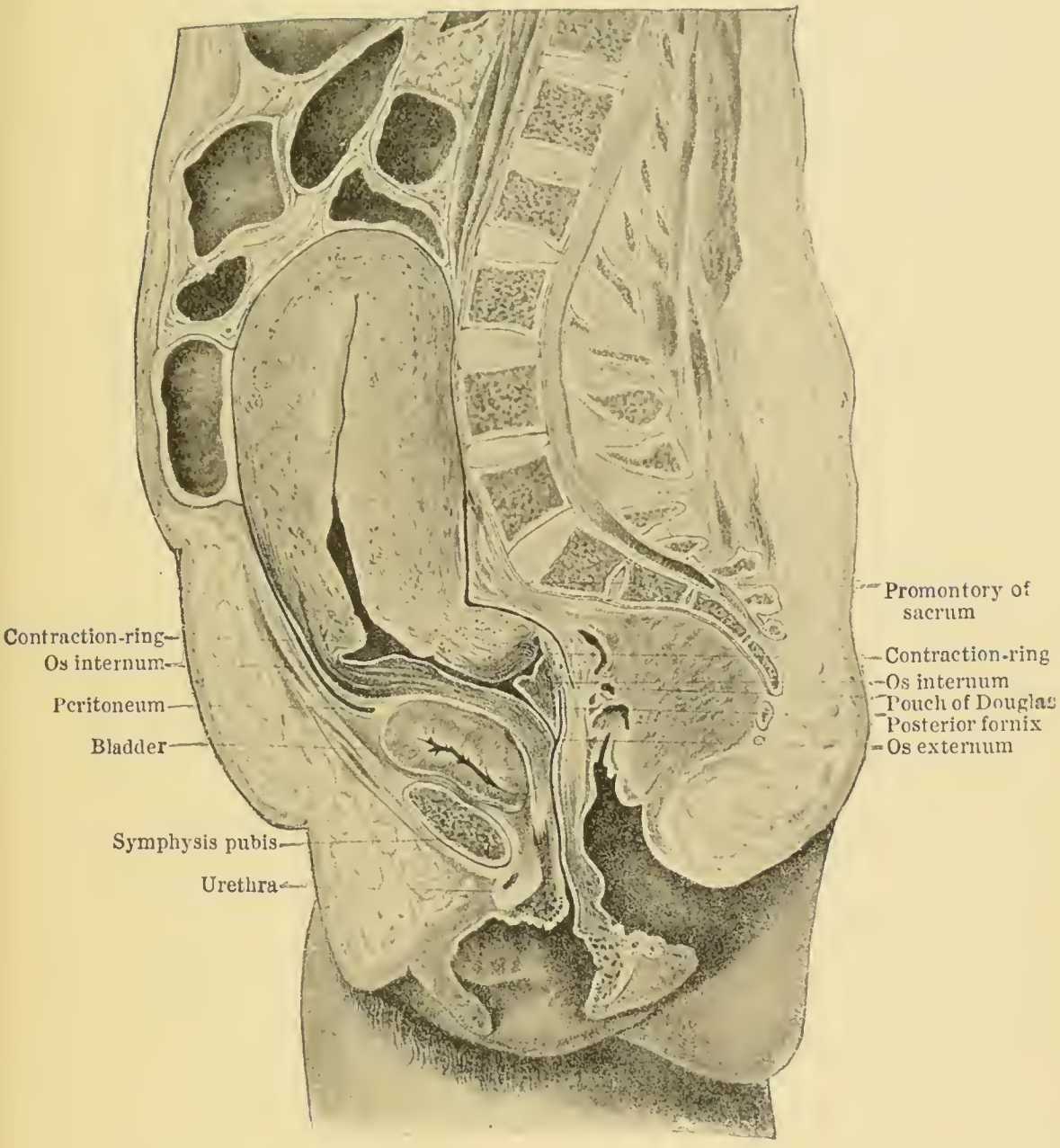

FIG. 45.—Section of a i-para who died within an hour after labour (Stratz). This section shows the uterus immediately after delivery. The conjugate is very short, so that the uterus and bladder have not sunk into the pelvis as they usually do after labour. Note the thick retracted uterine wall and the thin lower-segment and cervix. The anterior and posterior uterine walls touch one another, except where separated by a little blood clot. The vaginal walls also touch one another, showing that there is no empty space in the uterus or birth canal after labour.

THE MANAGEMENT OF LABOUR

Instruments, Appliances, and Arrangements

The bag used should be large, so that the different things carried can be got in and out of it easily. It should have a loose lining which can be taken out and boiled frequently. The following things should be carried :—

1. A nail-brush.
2. A cake of soap.
3. A bottle of turpentine. There are at least four uses for soap and water to which a little turpentine has been added ; namely, (1) for washing the hands, (2) for washing the skin of a dirty patient, (3) for injecting into the bowel as an enema, and (4) washing instruments.
4. Pellets of perchloride or bin-iodide of mercury for making lotion for the hands, and for the external genitals of the patient.
5. Carbolic acid, or one of the antiseptics sold as alternatives for it. An antiseptic of this nature may be required for vaginal douching, or a lotion that will not corrode instruments may be needed.
6. Powdered boracic acid for making a lotion with which to wash the baby's eyes and mouth and the mother's nipples.
7. An antiseptic lubricant, such as carbolised vaseline, glycerine jelly or glycerine, with which to anoint the fingers for vaginal examinations. This should be carried in collapsible tin tubes with screw tops.
8. A Higginson's syringe for giving enemata.
9. A pair of large scissors.

10. Thread or tape for tying the umbilical cord. This should be boiled before use.

11. Tow or cotton wool with which to wash or swab the patient's external genitals. This should be boiled or soaked in an antiseptic lotion before use.

12. A catheter.

13. A clinical thermometer and a supply of blank charts.

14. Some appliance for vaginal douching.

15. A preparation of ergot.

Antiseptics.—Perchloride of mercury (corrosive sublimate) and bin-iodide of mercury are the strongest and most valuable of chemical antiseptics. They are salts of the metal mercury or quicksilver, and are violent poisons. They are generally carried in the form of pellets or tablets, which on being dissolved in water make a mercurial lotion. The label of the bottle in which such pellets are sold always tells the strength of the lotion which is made by dissolving one of the pellets in a definite quantity of water. For example, the strength of a lotion is said to be 1 in 1000 when the weight of one pellet is $\frac{1}{1000}$ part of the weight of a pint of water in which it is dissolved. Weaker lotions are made as required by the addition of more water. For the disinfection of the hands and arms no plan is better than soaking them for five minutes in a mercuric lotion, 1 in 1000, after first washing them and scrubbing them for five minutes with soap, turpentine and hot water to free them from dirt and grease. The nails should be short and clean before the scrubbing is begun. The mercurial lotions are violent poisons, so must be carefully preserved, lest they should be mistaken for medicines by adults or swallowed by children. Instruments made of metal should never be placed in mercurial lotions, which tarnish and corrode them very rapidly.

Carbolic acid or phenol is another valuable antiseptic. It is sold as a liquid, but it often forms solid crystals in its bottle in cold weather. One part of phenol will dissolve in twenty parts of water, making the lotion known as "1 in 20 carbolic." This is much too strong for the hands or any skin, and it is used with the addition of two parts of water to one of lotion, namely 1 in 60, or three parts of water to one of lotion, namely 1 in 80. Instruments may be laid in it after they have been boiled, and it may be used for bathing the external genitals, but it has a very irritating effect upon the skin.

Phenol is the active substance or basis of most of the disinfectants which are advertised and sold under various names.

Condy's fluid, which is so largely used by the public, is a very strong solution of permanganate of potassium. This substance has a wonderful effect in destroying bad smells; but, in weak, claret-coloured solutions as generally used, it has not much effect in the actual killing of germs. Used strong enough to turn the skin a rich brown colour it is more effective, and the discoloration can be removed by soaking the browned skin in a solution of oxalic acid. This is one of the favourite methods of disinfecting the hands.

Boracic acid is a weak antiseptic, valuable because it is very harmless. Twenty ounces (1 pint) of water will dissolve one ounce of it, making one in twenty boracic lotion.[1] This can safely be used for washing a baby's

[1] If a quantity of pure carbolic acid be put in a large bottle and anything less than twenty times that quantity of water be added, some of the carbolic acid will remain undissolved at the bottom of the bottle, the water becoming "one in twenty" carbolic lotion. After using some of the lotion, more water can be added, and as long as phenol remains at the bottom of the bottle, one in twenty lotion can be obtained by adding water, shaking up, and waiting till the solution clears. In the same way a quantity of powdered boracic acid may be put in a large bottle, which is then filled up with warm water. After allowing time for the water to dissolve all the boracic acid it can take up, the fluid is "one in twenty" boracic lotion. So

eyes and mouth and the mother's nipples, as a good deal could be swallowed without doing any harm.

The Higginson's Syringe is one of the most useful instruments carried. It is for injecting water into the rectum and lower bowel. The name "enema" (plural enemata) is given to injections into the rectum, and enemata are used for several purposes. In midwifery they are used principally for emptying the bowel by softening and causing the expulsion of fæcal matter. Nutrient enemata are given to patients who cannot take food by the mouth and stomach. Saline solutions are injected into the bowel in order that the fluid may be absorbed into the circulation in cases of shock and loss of blood.

An enema should be given with the patient lying on the left side, for the rectum being on the left side of the body, water flows into it most easily in this posture. For emptying the bowel, water is used at a temperature which the hand bears easily (about 95° F.). A little plain white soap is generally dissolved in it, and about one and a half pints is the quantity prepared. This is called a simple enema. The addition of an ounce or so of glycerine makes the enema more stimulating and effective. Turpentine is more active than glycerine in causing the bowels to act. A tablespoonful of turpentine should be thoroughly mixed with each pint of soap and water used. In some cases, when the bowels are very obstinate, alum acts better than anything else. A teaspoonful of powdered alum may be used in each pint of water, and soap must not be used with alum. When there are hard masses in the bowel, an enema of warm olive oil favours and eases their expulsion. Nutrient enemata, being intended

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long as any boracic acid remains at the bottom of the bottle, one in twenty lotion can be obtained by adding warm water, shaking up, and waiting a few minutes. This method saves the trouble of measuring and weighing the antiseptics and the water used.

to remain in the bowel, should be small in quantity. They are generally given with a small bulb syringe holding just three ounces, and they consist of beef-tea with a little brandy, or any nourishing fluid which may be ordered. "Normal saline solution" is water with one teaspoonful of common salt dissolved in every pint. Small quantities of it injected into the bowel from time to time are quickly absorbed, and help to fill up the patient's blood-vessels in cases in which much blood has been lost.

The Catheter.—The short instrument, made of metal and known as a "female catheter," is too short to reach the bladder conveniently when it is drawn up during labour, and should never be carried. A rubber catheter of the ordinary kind, size 10 or 12 will be found the most useful. It is only on very rare occasions that the midwife or nurse has to use the catheter in obstetric work.

When for any reason the bladder must be emptied by means of a catheter, certain definite precautions must be taken.

1. The catheter must be sterilised by boiling and placed in an antiseptic lotion.

2. The hands must be sterilised.

3. The patient's external genitals must be bathed with an antiseptic lotion.

The opening of the urethra must be fully exposed to view by separating the labia with the fingers of the left hand. The catheter, after being dipped in an antiseptic lubricant, must be passed straight into the urethra without touching anything whatever on the way. Unless these precautions are observed, micro-organisms may be conveyed into the bladder, and may cause inflammation of its lining (cystitis), which may have the most serious results. (See pages 147, 242.)

The Clinical Thermometer and the Chart.[1]—The thermometer is to be used morning and evening for taking the temperature of the patient. This, with the pulse-rate, the motions of the bowels, and other details, should be either marked on a "chart" or regularly written down in a note-book.

The nurse or midwife should keep a record of pulse and temperature regularly, beginning at her first visit to the patient, for it is often very useful to know the state of the pulse and temperature during the labour as well as after it is over.

It is usual to say that the normal temperature of the healthy person is ninety-eight and a half degrees according to the Fahrenheit scale used for thermometers in this country. It is common to imagine that anything called normal is right, correct, and healthy, and that anything described as abnormal is wrong and more or less removed from health. "Normal" and "abnormal" are words which enter very largely into the conversation of those engaged in medical work. Nor is there any objection to their use, provided that it is always remembered that "normal" really means only common or usual.

For instance, if the pulse-rate be counted in ten or a dozen women, it will be found that the average rate is about eighty beats in the minute. This does not mean that there is anything wrong with one woman whose pulse-rate is seventy-five, or with another whose rate is eighty-five. For the pulse-rate varies in different healthy individuals. It is quicker in some positions than in others, and at some times of day than others, while it also becomes more rapid during exertion or excitement.

In the same way the temperature can vary a little without any departure from health. The average temperature in

[1] The chart should not be displayed on the wall; it is for the private use of the midwife or nurse and doctor, not for the patient and her friends.

some animals is much higher than that of others: birds, for example, being all their lives in what for human beings would be a state of high fever. Different persons also have different average temperatures. What is of value is a record of the changes in temperature which occur from day to day and from hour to hour. And this is the reason why charts should be kept. The relation between the pulse-rate and the temperature is also most instructive, so that pulse and temperature should be taken and recorded together.

Apparatus for Vaginal Douching.—It is usual for midwives to carry a douche can, or a long rubber tube which can be used as a syphon, for securing a stream of water with which to wash out the vagina. In midwifery, the vagina is not douched except for some special reason and after orders from a medical attendant. The douche can is carried simply in case a doctor should order a douche. Whenever this is done, instructions will be given as to the quantity of water, the nature of the antiseptic to be put in it, if any is required, and the temperature at which the douche is to be used. It is of course easy to douche the vagina with a Higginson's syringe like that used for giving enemata. But an instrument which is used for the rectum must never be used for the vagina, because the rectum is full of micro-organisms which, if introduced into the vagina, are able to cause infection. It is impossible to sterilise an enema syringe perfectly. One that has been used for the rectum must thereafter be considered to be septic. Therefore two separate instruments have to be carried, one for injecting the rectum alone, and a different one for douching the vagina. Two Higginson's syringes would do, but it is so easy to mistake one for another that an entirely different instrument such as a douche can is much to be preferred.

Extract of Ergot.—It is usual for medical men and midwives to carry the liquid extract or some other pre-

paration of ergot, a fungus which grows on the ears of rye. One effect of this drug, the one for which it is valued, is to make the uterus contract. It also upsets the stomach and tends to weaken the action of the heart. The awkward feature of the drug is that if given in large enough doses to affect the uterus much, it tends to make the organ contract and remain contracted. Thus it often does more harm than good. A dose of ergot given while the placenta is in the uterus will often cause the greatest difficulty in getting the placenta born, by causing firm contraction not only of the body but also of the mouth of the womb. *Ergot must never be given until the womb is quite empty; that is, until the placenta and membranes have been delivered.*

If labour is properly conducted it is very seldom required. The extract soon goes bad and loses its strength, so that to be any use the supply must be frequently renewed. The best course is to get very little at a time and to use it as little as possible. (See pages 134, 212, 232.)

Doctors generally inject ergot into the muscles of the buttock with a needle. Midwives usually give a teaspoonful of the liquid extract by the mouth.

The Lying-in Room and the Patient

The Lying-in Room.—The lying-in room must be thoroughly well ventilated, abundance of fresh air being needed by the patient during the violent physical exercise of labour, and also by mother and child during the puerperium. It should therefore be a large room; in small houses it should be the largest and best in the house. When arranging for a confinement this should be secured without any regard to the convenience of the household. The safety of the mother and child is the chief consideration. So secure the parlour or drawing-room or spare bedroom if it suits the purpose in hand.

The room should be prepared by a thorough "Spring cleaning," floor and paint being scrubbed with carbolic soap. The walls should be swept, all pictures, furniture and ornaments being carefully freed from all particles of dust. All curtains, window hangings, chair covers, cushions, mats, carpets, in fact all woven materials that cannot be boiled, are sources of danger, because of the dust they harbour. Thus, to secure the very best conditions for a confinement, all these things should be banished from the room, making it as plain and bare as a hospital ward.

The lying-in room should not be near any water-closet, sink, or housemaid's cupboard, and unless the plumbing in the house is absolutely above suspicion, there should be no fixed basin with water supply and waste pipe in the room. A discharge pipe should be short and should open clear into the open air outside the room. Those which lead into other pipes and are continuous with drains in the lower part of the house are positively dangerous however well they may be "trapped."

The room must be warm enough for comfort, and even in summer an open fire should be kept burning in it on account of its value as a ventilator by causing a draught up the chimney. Gas stoves are unsuitable for the lying-in room, and if one is used, any sheet of metal which has been fastened over the fireplace must certainly be removed, leaving the entrance to the chimney quite free.

The windows should be kept wide open as much as possible during labour and during the lying-in time. Short of this, a board a few inches wide may be fitted into the window-frame at the bottom and the lower part of the window shut down upon it, so that a current of air is admitted between the upper and lower parts of the window-sash. The value of the open door in ventilation must never be forgotten. Indeed it is well to let the door stand wide open through the whole lying-in time. This

admits plenty of air which has become somewhat warm and dry in passing through the rest of the house, and this is better than cold wet air from the window in bad weather. Many patients do not like an open door, and it sometimes causes draughts. A good large screen should therefore be placed either close to the door or on the door side of the bed. The patient then does not know whether the door is shut or open, and is protected from draught.

It is much more convenient to deliver and nurse a patient in a single bed than in a double one, and a small bed should always be chosen when possible. This has the additional advantage that no child or other person can sleep with the patient. It should hardly be necessary to add that the nurse should never sleep in the same bed with the patient, but unfortunately this is still a very common custom. A monthly nurse should always have a definite understanding, when arranging for a confinement, that she is to have a bed to herself, and she should not consent to put up with a sofa. She cannot afford to lie in discomfort every night for a month, on account of her health. For the same reason she should bargain for an hour or two every day, after the confinement is well over, to be spent in out-door exercise.

The bed on which labour is conducted should be firm. A feather bed is intolerable, and if one is in use it should be removed and the bed made upon the mattress.

A wire spring mattress is also inconvenient, because the patient sinks down into it below the level of the edge of the bedstead, so that blood, lotion, and liquor amnii tend to form a pool, in which the patient lies. Therefore the spring mattress should be supported during labour by boards sawn to a suitable length and pushed under the spring, so as to rest on the sides of the bedstead. In most houses suitable boards can be found. Sometimes the

patient's husband will take a light door off its hinges for this purpose. The boards can be removed in order to let the patient lie softly soon after labour is over.

The floor by the bedside should be protected during labour by a piece of linoleum or oilcloth, or by sheets of paper. The valance should be removed, and the bedding protected with mackintosh sheeting. It is important that nothing soiled be used as the pad on which the patient is to lie during labour. Squares of thick cotton wool or wood wool are the best for this purpose.

In many houses it is very difficult to get a sufficient supply of hot water, and when making her preliminary arrangements the nurse or midwife should not forget to secure this. If there is no kitchen boiler, and only one kettle, two or three more kettles should be bought or borrowed for the occasion. The kitchen fire should not be allowed to go out during the excitement which upsets the household.

The Patient.—Early in labour the patient should have a hot bath whenever this is convenient. It is possible to give hot baths even during the second stage, but it is not usual to do so. In many cases the nurse has to be content with washing the patient carefully all over in bed. The patient's hands should be sterilised with antiseptic lotion, because many women keep touching their pudenda during labour and so may infect themselves if their hands are not surgically clean.

The pudenda must be made as clean as possible. All pubic hairs which are within reach of the vulva should be clipped away with scissors, for when the hair gets matted into tags by clotted blood and mucus it adds greatly to the difficulty of keeping the parts clean. Prolonged bathing with antiseptic lotions should follow ordinary washing. The patient's head should be washed before labour, and her hair dressed so as to be neat, and in such

a way that she can lie on her back without inconvenience.

The patient's clothing should be all newly washed, light, and warm. As labour goes on the night-gown should be rolled up and fastened round the chest, and a newly-washed skirt should be worn below it. The patient may wear fresh washed stockings, but her feet and legs must be washed as clean as possible before the stockings are put on. Many a patient is infected with dirt from her own feet.

Management during the First Stage of Labour

When a midwife receives a message asking her to go to a patient who is said to be in labour, there are several reasons why she should go at once, although it may be hours or days before she is actually needed. A visit relieves the minds of the patient and her friends. It informs the midwife of the state of affairs, and enables her to arrange her day's work accordingly. She may be able to relieve suffering, and, most important of all, she may discover something wrong which can be put right at an early stage, but which might have serious consequences if not recognised without delay.

The midwife, therefore, should always be clean, and her bag should always be ready for use at a moment's notice.

Occasionally women who are not pregnant at all fancy that they are so, though assured of the truth by one doctor after another. Sometimes there is an abdominal tumour, but in most cases the woman is at the change of life, and mistakes the stoppage of menstruation for the beginning of pregnancy. She has often put on a good deal of fat, as is usual at this time of life. With fat, together with constipation and flatulent indigestion, the abdomen may reach a considerable size, and finally an attack of colic, "gripes," or "windy spasms" is mistaken for the pains of

labour. The patient then sends for a midwife or doctor, and owing to the nature of the case, the attendant sent for is generally one who has not seen the patient before. On seeing a patient for the first time one should always make sure that she is pregnant before making the arrangements for labour.

Apart from these rare cases of false pregnancy, the first thing that has to be done on visiting a woman who says she is in labour is to find out whether she is really in labour or not. Nothing is more common than for a patient to mistake intestinal pain of a griping nature for labour pains. Women constantly speak of false pains and true pains. The distinctions between these were described before (see page 42); for convenience they are summarised again here.

True Pains	*False Pains*
1. Begin in the back.	1. Are felt in front.
2. Are accompanied by hardening of the uterus, as felt by abdominal palpation.	2. Are not accompanied by uterine contraction, as felt through the abdominal wall.
3. Occur at more or less regular intervals.	3. Occur irregularly.
4. Separate the membranes near the os, and so cause a blood-stained "show."	4. Do not cause a "show."
5. Produce dilatation of the cervix, as recognised by vaginal examination.	5. Do not affect the cervix.

False pains are generally the result of constipation and accompanying flatulence. The best treatment for them is an enema of hot soap and water (1½ pints of soapy water, with a tablespoonful of turpentine thoroughly mixed). The water must not be as hot as the hand can bear, or it will be too hot for the tender skin near the anus of the patient, which should be protected by vaseline or lanoline.

An enema is always given if the patient is truly in labour, and it is the best treatment if she is not, so the rule comes to be, when sent for to a woman who says she is in labour, always give an enema. It has the additional advantage that it is "doing something" for the patient; the attendant does not simply call and leave the house without doing anything. Further, the hot enema generally stimulates the uterus and starts good labour pains. Therefore, for false labour pains give an enema, and if the result is not good, repeat it as often as may be required before leaving the house. Three or four injections may be necessary, and the more water is used each time, the better the result.

Patients do not like enemata as a rule, and refuse them if possible. Midwives and nurses do not like giving them, and unfortunately many of them will take any excuse for neglecting them. But the washing out of the bowel is most important, and cannot be neglected without serious risk. In the first place, a loaded rectum is an obstruction which may delay labour. Secondly, if the rectum is not empty, fæces will be squeezed out at the end of the second stage when the head is in the perineum. The rectum is full of germs, and it is easy to infect the patient with germs from her own rectum if this is not well washed out early in labour.

The first few minutes after the midwife's arrival should be spent in talking to the patient, in quietly observing the frequency, duration and severity of the pains, and in asking her the necessary questions. If there have been previous confinements, inquiry should be made, if this has not already been done, as to their number, nature and results, and whether instrumental assistance has been required. The health during pregnancy should be inquired into, also the time when the pains began; whether there has been a "show," if the membranes have or have

not ruptured, when the bowels were last moved freely, and whether the bladder has been emptied at the usual times. The midwife may obtain hot water and go on with the disinfection of her hands while talking. She will then find it convenient to make an examination of the abdomen. This should be done with the patient lying on her back, the head and knees raised. It should then be easy to make sure by feeling that there is a child in the uterus, and to feel and see the contractions of the womb. The movements of the child may also be seen and felt, and its heart sounds may be heard. The lie, the presentation and the position of the child should be ascertained. If the lie is transverse, help should be secured. If the lie is longitudinal, the child's head should be felt for, in order to determine whether the head or the breech is presenting. The position should also be learnt by feeling the child's back or its limbs to one side or the other of the mother's abdomen. The size of the uterus should be noted, also the condition of the abdominal wall —strong and firm, or weak and flabby. The quantity of liquor amnii in the uterus can be judged to some degree.

If nothing is wrong, and the case is an uncomplicated vertex presentation, or a breech, footling or knee presentation, the midwife will make her arrangements for labour. If, on the other hand, she discovers any abnormality or complication, she will advise that a medical man be sent for.

The enema should be given at this time, and this can always be done unless the head is already so low down in the pelvis that the anus is pressed on by it. It must be remembered that the anal canal runs upwards and forwards, while the vaginal canal runs upwards and backwards, the two thus being at right angles to one another, with the three-cornered perineal body between them. Thus if the head is already low in the pelvis, the nozzle of an enema

syringe passed in at the anus would push straight against the child's head.

The midwife has already washed her own hands once, and before giving the enema she must wash the patient's external parts with soap and water, and bathe them with an antiseptic lotion.

After giving the enema she will again wash her own hands and again bathe the patient's pudenda. It is important that in all wiping and bathing the movements are made from the vulva towards the anus and past the anus backward, so that no dirt from the anus can be carried forward into the vulva, where it might cause infection.

Any pubic hair which is near the outlet of the vagina should be clipped away with scissors. After these repeated washings the nurse's hands and the patient's vulva and pudenda are beginning to be moderately clean. The vaginal examination should be done only after these repeated washings, and after the midwife has given her hands a final soak in an antiseptic lotion.

Making the vaginal examination with two fingers the following points should be noted.

The vaginal opening may be large or small. The perineum may have been torn previously; it may be rigid and hard, or it may be soft and yielding.

The vagina itself may be wide or narrow. Its walls should be cool, moist, and well lubricated with mucus, but they may be dry and hot. The walls of the vagina are generally smooth and lax in multiparous women, but folded into ridges in primiparæ.

The distance between the ischial tuberosities should also be estimated — the width of the pelvic outlet in fact. The position of the tip of the sacrum and the shape of the coccyx can also be felt, and sometimes give an indication that difficulty may occur in the escape of the head from the bony pelvis.

If the promontory of the sacrum can be felt during vaginal examination with fingers of ordinary length, it is certain that the true conjugate of the pelvis is small and that difficulty may be expected owing to contraction at the brim. If the promontory can be felt a doctor should be sent for at once, however favourable the case may appear in other ways.

The cervix must next be observed or its state as regards softness noted. Is the internal os dilated so that the external os forms a narrow rim, or is there still a canal between os externum and os internum ? How large is the os externum ? How many fingers will go through it ? It is usual to express the size of the os by comparing it to the size of various coins—a shilling, a half-crown, or a crown. As to the membranes, do they form a bag of waters ? Is the bag regular in shape, or is it elongated or peculiar in any way ? How much liquor amnii does there appear to be ? Are the membranes already ruptured ? The presenting part should also be felt and its position recognised, confirming or altering the opinion formed by abdominal palpation. It is by no means easy, however, to exactly determine the position early in labour. It is enough to recognise the vertex or the breech and to make sure that the face or the brow is not the presenting part. If the face or the brow is felt, a doctor should be sent for (see p. 194).

It is well to examine during a pain in order to observe the effect of uterine contraction on the cervix, the bag of waters, and on the presenting part.

The midwife's next duty is to make all the preparations for labour, seeing to it that the room, the bed, the patient, the child's clothes, the necessary lotion, towels, cloths, swabs, and other articles are ready, together with also a supply of hot water which has been sterilised by boiling.

The midwife must not leave the patient after the

second stage of labour has begun. Early in the first stage she may leave the house in a first case if dilatation is not more than half completed, but if the os is as large as half a crown in a parous woman she had better not leave her patient. The only way to find out how far dilatation has advanced is by vaginal examination.

The bladder must not be allowed to get full during the labour, as if distended it interferes with progress. The patient must be told to empty it from time to time.

During the first stage the patient should not make any efforts to "bear down," and must be restrained from doing so. Voluntary exertions at this time do no good and only exhaust her. Until the second stage begins, the patient generally walks about or sits in a chair. There is no advantage to be gained by keeping her in bed before the rupture of the membranes. This should not occur before the os is fully dilated, but it often happens sooner. This is the signal for a second vaginal examination. The rule is to avoid examinations, with the exception of one early in labour and another just after the escape of the waters.

Therefore, after the waters escape, the patient's pudenda should be bathed again, and the nurse's hands again sterilised. The examination should be made at this time to see whether the dilatation of the os is complete; to make sure that the presentation and position are satisfactory; and to make sure that the cord has not prolapsed, as sometimes a loop of the cord is carried down in the rush of escaping waters (see page 224).

If the os is not completely dilated, the conclusion is that the waters have escaped too soon, and the first stage is not yet over. This often indicates that the presenting part does not fit nicely into the pelvis, and that the midwife, while exercising patience, must be on her guard.

If all is well and the os is fully dilated, she realises that the end of the first stage is reached and expects expulsive or down-bearing pains to begin without further delay.

Sometimes, however, the midwife recognises from the nature of the pains that the second stage has begun before the waters escape. Then, after finding on vaginal examination that dilation is complete, she may rupture the membranes, as the presence of the waters during the second stage tends to slow the progress of labour. The membranes should be torn with some blunt instrument which has been boiled. A pair of scissors, for example, may be passed up beside a guiding finger and pressed through the bulging bag of waters during a pain. Care must be exercised to avoid injuring the child or any part of the mother.

Management during the Second Stage of Labour

After the escape of the waters it is safest to keep the patient in bed, although some women prefer to kneel on the floor, leaning over a chair or the side of the bed. These women should not be thwarted in any way. Squatting or kneeling is the natural and the most easy posture in which to expel the child, and the woman will seldom insist on kneeling unless she is strong enough to go through labour in this position. Generally, however, the patient lies on her left side with the buttocks close to the edge of the bed. The knees are drawn up, and the head and shoulders are well over towards the other side of the bed.

When the voluntary expulsive or down-bearing pains begin, the patient should be helped to fix her hips by giving her something firm, such as a box or a footstool, to press against with her feet. Also she should be able to fix her chest by pulling with her arms on a firmly fastened

roller towel or something of the kind. This fixing of the body enables the abdominal muscles to work to the best advantage. She should now be told to refrain from calling out during the pains, and encouraged to hold her breath and "bear down."

When the head approaches the vaginal outlet, the perineum is bulged, flattened out, and lengthened from its usual measurement of about $1\frac{1}{2}$ inches to 3 or 4 inches. The anus at the same time is dilated and opened out to form a D-shaped hole. These are the signs that the child is just about to be born. At this time it is important to clean away any fæcal matter that escapes from the anus, washing and wiping always backwards and away from the vulva. When the child's head is seen at the opening of the vagina, it is necessary to do all that is possible to prevent serious tearing of the perineum as the head escapes, though in first cases it is impossible to avoid slight tearing of the skin and the mucous membrane of the vagina. The head must be prevented from escaping too quickly by checking it with the hand. Extension of the head must be prevented and flexion preserved as much as possible, because if the head is extended, a longer diameter is presented to the vaginal outlet than when the head remains flexed. The occipito-frontal diameter is larger than the sub-occipito-bregmatic.

When the patient's legs are drawn up with the knees raised, the skin round the vaginal outlet is stretched tight, and tears easily. To set free skin and lessen tearing, the legs should be straightened out in a line with the body. When the perineum is unusually long and tense, the legs should be straight down the bed as the head is born, the left lying on the bed, and the right supported by an assistant or by the shoulder of the midwife. This often saves a bad perineal tear.

As soon as the head is born, two things must be

attended to. First, it must be seen that the cord is not tightly stretched round the child's neck, for this both stops the blood flow in the cord and prevents the child from beginning to breathe for itself. If the cord is round the neck, the loop should be quickly pushed over the top of the head. If it is too tight to go over, it must be cut. The usual way is to tie the cord in two places and then cut between them: but it is much quicker and easier to put two pairs of artery forceps on the cord and cut between the forceps.

Second, the child's eyes must be wiped clean as soon as possible, so that none of the discharge, blood, and greasy material with which the child is covered may get into the eyes when they are first opened, and so may set up that inflammation of the eyes called ophthalmia of the new-born.

The fundus of the uterus is now for the first time lower in the abdomen than it has been during labour; a hand should be kept upon it, seeing that it remains shaped to the breech of the child. Nothing should be done during the next few moments until external rotation of the head has occurred. Then the shoulders, one in front and one behind, may be gently helped through the outlet with a finger under the armpit which can most easily be reached. The child is then practically born. It should be placed on the bed out of the way of the mother's legs and in such a position that there is no pull or drag upon the umbilical cord.

There is often a great deal of unnecessary smacking of the new-born baby. This is seldom required; it is only necessary to see that its mouth and throat are free from blood and mucus, and the healthy child will soon breathe. If it is not able to do so (see Asphyxia, page 227), it is best to cut the cord at once and begin means for its revival.

If the cord is tied immediately, a certain amount of blood which belongs to the child is left in the placenta.

So it is best to wait until the pulsation in the cord ceases, or at least for five minutes.

A ligature of boiled thread or tape is then tied tightly round the cord about 1½ inches from the child. This keeps the child's blood from escaping when the cord is cut. It is usual to tie a second ligature about an inch further from the child, and to cut between the two. This is by no means necessary unless there is a second child in the uterus, whose blood might escape from the cut end of the cord belonging to the first child. But the second ligature, by keeping the blood in the placenta, makes the placenta rather larger and bulkier than it would be if the blood escaped. This favours the separation and expulsion of the after-birth; for the bigger it is, the more easily does the uterus close upon it and squeeze it out.

This completes the management of the second stage of labour. For as soon as the cord has been cut, and the child has begun to breathe in a satisfactory manner, it should be wrapped up in a piece of some soft, warm material and put in a warm place, where it can be safely left until the mother has received the attention she needs during and just after the third stage of labour.

Management of the Third Stage of Labour

It is well to realise that the third stage, namely the separation and birth of the placenta, is the part of labour which demands the most care and skill on the part of the midwife. If this matter is not properly managed there is grave risk, in the first place, of post-partum hæmorrhage. Secondly, portions of the placenta or membranes may be left in the uterus. These may by decomposition set up puerperal fever, or may cause bleeding either at once or at any time during the lying-in period.

While the uterus rests after the final contractions which

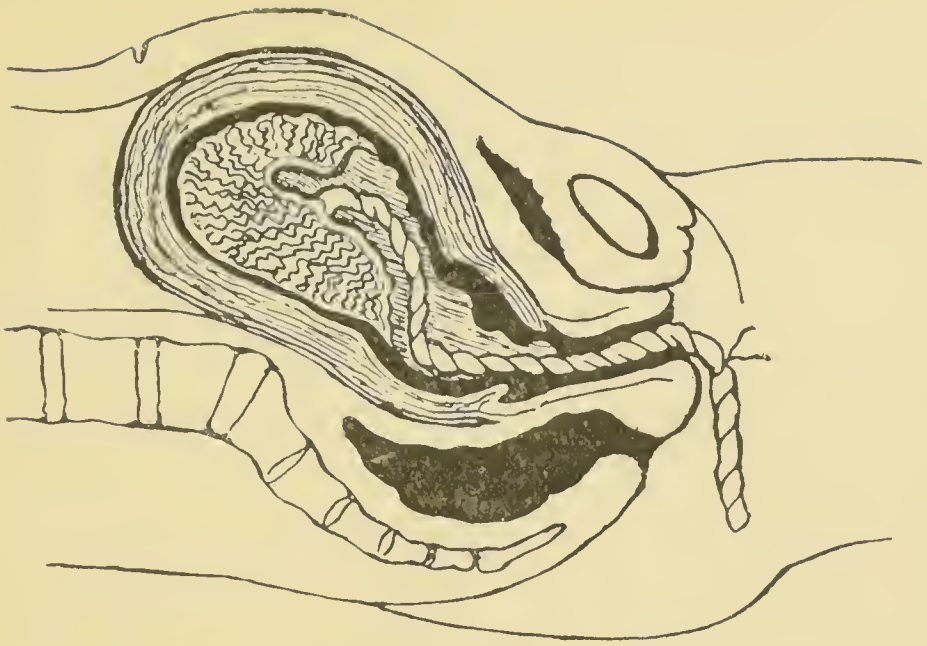

Fig. 46.—Early in the third stage. The uterus is large and rounded. The fundus is at the level of the navel. The placenta is still in the body of the uterus. A piece of thread is shown tied round the cord just outside the vulva. This is the time for gently rubbing the uterus.

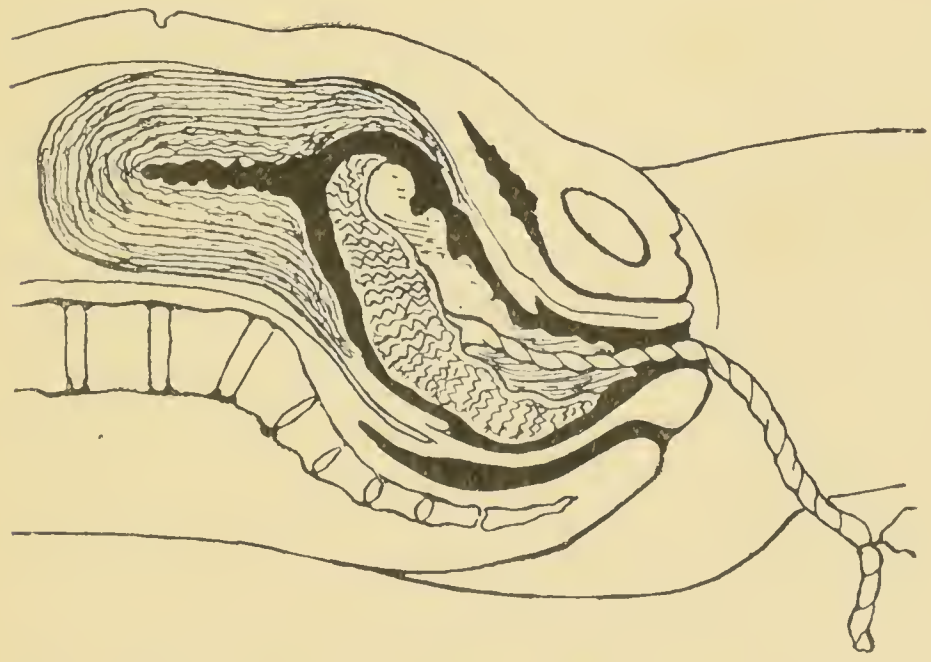

Fig. 47.—Late in the third stage. The uterus is smaller and flatter than before. The fundus is higher in the abdomen than before. The placenta has been separated from the uterine wall and expelled from the body of the uterus. It lies in the birth canal (lower-uterine-segment, cervix and vagina). The thread shows that several inches of cord have escaped from the vulva. This is the time for expressing the placenta by firm downward and backward pressure on the fundus.

have expelled the child, the nurse or midwife must do nothing beyond keeping one hand on the fundus for some time to make sure that the uterus does not relax too much and become filled with blood. If too soft, the uterus should be gently rubbed and kneaded from time to time, but no force should be used, as this may tear the placenta or separate it from the membranes. Gradually contractions return and the retraction which remains after each pain makes the uterus feel smaller and firmer. The attendant must now remember the signs which show that the placenta is separated and has passed from the uterus into the vagina. They are, (1) smaller size and (2) altered shape of the uterus, (3) rising of the uterus higher in the abdomen than it was just after birth of the child, and (4) escape of several inches of the cord from the vagina. When these changes have occurred, then it is time to remove the placenta from the vagina. This can be done by pressing the uterus firmly down into the pelvis. Sometimes it is sufficient to hook back the perineum with the sterilised forefinger. The cord must never be pulled, as this may separate the placenta before the uterus is retracted, so causing free hæmorrhage; or it may even turn the uterus inside out (inversion).

When the placenta is outside the vulva it should be turned round and round, so as to twist the membranes into a rope. This favours the removal of the membranes complete and untorn. If any portion refuses to come away easily, a finger should be passed up beside the twisted rope and used to gently loosen the portion which sticks. A hand should be kept on the fundus, gently rubbing it, for several minutes after the birth of the placenta. If there is alarming bleeding during the third stage, the midwife should firmly squeeze the uterus with both hands to complete the separation of the placenta, for bleeding of this kind occurs when one part has separated while the other part remains

attached and prevents the uterus from retracting and so stopping the hæmorrhage. The author considers that in the presence of alarming bleeding, which is not checked by squeezing the uterus through the abdominal wall, the midwife is justified in putting her sterilised hand into the uterus and removing the placenta after carefully completing its separation with the fingers. In these circumstances there is not time to secure help; what has to be done must be done at once. The occurrence is very rare.

In the absence of bleeding the attendant should wait patiently for the signs of separation of the placenta, and if it does not separate within an hour from the birth of the child she should send for help, as the placenta is probably "adherent" over its whole surface. She need not hold her hand on the fundus all this time, but may go on with her other duties.

Duties after Labour is over

At the earliest convenient moment the placenta and membranes should be examined to see that they are complete. This is best done by holding the membranes up and noticing whether they form a complete bag. The two membranes should then be separated, to show that amnion and chorion have both come away. The maternal surface of the placenta should then be placed uppermost, while the fœtal surface rests upon both hands. It is then easy to distinguish mere tears between the lobes of the placenta from the actual absence of portions. Tears close up naturally when the hands support the whole mass, whereas absent portions leave gaps not closed in this manner. Any hole in the membranes other than the one through which the child escaped suggests that an extra lobe of placenta separate from the general mass has been left in the uterus (Succinturiate placenta). If the afterbirth is not complete, help should be summoned.

After the third stage of labour is over and the uterus is empty, it is allowable to give a teaspoonful of liquid extract of ergot if the womb does not retract firmly and if there is more bleeding than is natural. Experience is the only guide in this matter. If the uterus is well retracted, and yet blood continues to flow freely, it must come, not from the uterus, but from a tear in some part of the birth canal, generally in the cervix. Tears which cause continued bleeding should always be attended to by a medical man. In every case the perineum should be examined. In all first labours, slight tearing is to be expected. If only the skin of the perineum and the mucus membrane of the vagina are torn, nothing need be done; but if the tear extends into the perineal body, it is the midwife's duty to see that a medical man stitches the tear within a few hours. If left unrepaired, these tears may form a starting-point for infection, and in any case they heal up leaving the vaginal opening permanently enlarged and the floor of the pelvis permanently injured in a way which may cause bladder trouble and favours falling of the womb in later years.

The midwife's next duty is to remove all soiled clothing from the patient and all soiled articles from the bed and from the room. She must also wash the patient and make her comfortable in bed by the proper methods employed by nurses. The pudenda should be bathed once more with an antiseptic lotion, and protected with a sterilised napkin or pad of cotton wool, wood wool or gauze. Many good nurses apply first a pad of wadding or gauze wrung out of lotion, and cover it with another larger dry pad or a napkin.

The binder should next be applied. It should be 14 inches wide and long enough to go once and a half round the hips. It should be made of a firm, strong material, and should be applied so as to grip tightly below

the great trochanters. The upper part is more loosely fastened, or it will interfere with the patient's breathing and the movements of the bowels. Except in very thin women it is not necessary to put any pads under the binder, and if pads are used they should be placed one at each side. If a single pad is used it slips to one side and pushes the uterus over to the other side. The use of the binder is to give a sense of support and relief to the wearied lower parts of the body during the two or three days following labour. It is of no value for preserving the slimness of the figure.

The patient's head should be kept low, the pillow being removed for an hour or two. This lessens any tendency to faintness due to loss of blood or to fatigue. If she shivers and feels chilly, a hot drink may be given, and she may have a hot bottle at the foot of the bed. Alcoholic stimulants should be carefully avoided. A plentiful supply of fresh air must be provided by opening windows or doors, but the room must be warm and the patient must be protected from draughts. The room should be partly darkened, and she should be encouraged to go to sleep.

After the mother, the child demands attention.

It should be carefully examined for deformities and peculiarities, and to make sure that the bowel and the bladder have proper openings.

Whilst in the womb, the child is covered more or less with a greasy material called *vernix caseosa*, and to ease the removal of this it is usual to rub the child all over with olive oil before washing it. The bath should be at 100° F., and the soap used should be plain and should not contain any free alkali, or it will irritate the tender skin. The eyes must be carefully washed with boracic lotion, and if the mother has suffered from any vaginal discharge, a little mercurial lotion (1 in 1000) should be dropped in, the eyelids being held apart with thumb and

finger. This is done to kill any germs which might set up ophthalmia, an inflammation of the eyes which is a very common cause of blindness.

The cord should be freely dusted with an antiseptic powder (boracic acid mixed with starch powder does very well), and should then be wrapped in sterile cotton wool, gauze, or lint. A very good old-fashioned dressing was a piece of clean rag with a hole burnt in it through which the cord was passed. The dressing of the cord is kept in place by a small flannel binder applied firmly but not tightly, and fastened with a few stitches.

Occasionally a child is too large for the clothes which have been provided for it, and in these cases the clothes should not be used, or the edges will quickly cut into the child's neck and arms and keep it awake. Many good nurses put a pad of absorbent cotton wool or wood wool inside the baby's napkin. This catches the child's motions and absorbs most of the urine. It can be burnt when the napkin is changed, and so saves a great deal of labour in washing, the napkins being much less soiled than when used alone.

Considerable time is occupied by the duties following the birth of the placenta, so when they are ended the midwife may leave the house, after taking a last look at the mother. She should look at the pad on the vulva to make sure that there is not too much bleeding, and should apply a clean one if necessary. She should also take the pulse and temperature and record them on the chart before going away.

Summary of Management of Normal Labour

First Stage

1. Examine as little as possible after making sure that the patient is in labour, and discovering the presentation and stage of dilatation.

2. Give an enema, and see that the bladder is kept empty.
3. Make all preparations for delivery in good time.
4. Let the patient move about.
5. Allow no stimulants, and only the lightest food.
6. Discourage expulsive efforts.
7. Do not rupture the membranes.
8. Never say when labour is likely to end.

Second Stage

1. Keep the patient in bed and do not leave her.
2. Examine once after the membranes rupture.
3. Encourage the patient to bear down.
4. Do not interfere until the head distends the perineum.
5. Prevent too rapid escape of the head; promote flexion and check extension as the head escapes.
6. Follow the fundus down, clear the child's mouth, and wipe its eyes.
7. See that the cord is not round the neck.
8. Do not hurry the delivery of the body.
9. Keep a hand on the uterus.
10. Wait until pulsation ceases in the cord before tying it.

Third Stage

1. Keep a hand on the fundus and do not hurry.
2. Do not attempt to deliver the placenta until it is separated from the uterus and passed into the vagina.
3. Expel the placenta from the vagina by pressing down the uterus.
4. Twist the membranes into a cord by turning the placenta round and round.
5. Keep a hand on the fundus for some time, and make sure that it is firmly retracted before leaving it.
6. Examine the placenta and membranes and make sure that no part of either is left in the uterus.

After Labour

1. Examine the perineum.
2. Wash the patient and apply vulvar pad and abdominal binder.
3. Remove all soiled articles.
4. Examine the child and attend to its eyes.
5. Wash the child and dress the cord.
6. Take the patient's pulse and temperature.

The Management of Cases of Pelvic Presentation

Breech cases are considered to be normal, but the child is always exposed to extra risks when it is born head last instead of head first. These risks are greater in first confinements than in those which follow, because they largely depend upon the state of the lower part of the birth canal, namely the vagina and perineum. These parts hinder the birth of the head much more in primiparæ than in multiparous women.

Cases of pelvic presentation should be recognised by abdominal examination. The lie of the child is longitudinal as in head presentations, and the head is not felt at the brim of the pelvis, but is found at the fundus. When the child's head is at the fundus, its pelvis is of course the presenting part.

There are three kinds or varieties of pelvic presentation : (1) The breech itself may present. (2) One or both of the feet may be felt through the os (footling presentation). (3) A knee may be felt (knee presentation).

1. On vaginal examination, if the os is sufficiently dilated, the child's sacrum may be felt, with a small opening in front of it, the child's anus, while in front of this again the external genital organs may be recognised. The two ischial tuberosities can also be felt, and if there is room, a finger can be passed into the fold of the groin.

It is sometimes mentioned that if a finger is passed up the child's anus, it comes away stained with the dark green contents of the unborn child's bowels, which is called meconium; but this is an unnecessary and clumsy way of discovering the nature of the presentation.

2. A foot can be distinguished from a hand, because the heel can be felt.

3. A presenting knee is not so sharp as an elbow.

It was mentioned above that the "position" in breech cases is the relation of the child's pelvis to the mother's pelvis, just as in head cases the "position" is the relation of the child's head to the mother's pelvis. The position should be recognised by abdominal examination. The first and third positions are common, while the second and fourth are rare (see page 95). The breech does not fit the brim so well as the head, the membranes often rupture early, and the first stage is often slow for these reasons. It is therefore more than usually important to avoid rupturing the membranes, so as to get complete dilatation before expulsion begins. Delay in delivery of the head through insufficient dilatation may cause the sacrifice of the child's life. The child's pelvis is broader from side to side than from back to front, and it enters the mother's pelvis with its transverse diameter (inter-trochanteric) in one of the oblique diameters of the mother's pelvis. The hip which first reaches the pelvic floor then comes forward in a movement of internal rotation and the breech escapes one hip in front and one behind.

There should be no interference until the breech is born, followed by the lower part of the body. But when the child's navel reaches the vaginal outlet, danger to the child begins, and the midwife must be active instead of merely watching the labour: for when the navel is born, the cord is likely to be squeezed between the child's body

and the vulvar outlet. If the blood flow in the cord is stopped by this pressure, the child will soon die. As soon as the child is born as far as the navel, a loop of the cord should be pulled down, so that it may easily be felt whether pulsation in the cord is going on properly. The child's legs and body should also be wrapped in a hot wet cloth to protect it from the air; for contact with the cold air often makes the child gasp and try to breathe, and by doing so before its head is born it may suck discharges into its throat and lungs in sufficient quantity to prevent breathing when the birth is over.

By this time there is nothing left in the uterus except the child's head, so the uterus has a much smaller mass to work upon at the end of labour than in head cases. The uterine contractions and retraction thus work at a disadvantage.

Besides the risk of pressure on the cord, there are now the risks (1) that the arms may get up beside the head; and (2) that the head may become extended, its long diameter so becoming jammed in the pelvis. These unfortunate accidents are best prevented by keeping up firm pressure on the fundus. So long as pulsation is good and regular in the cord, there is no immediate hurry; but if the pulsations become much weaker, much faster, or much slower than usual, the delivery must be quickly completed.

By pressure on the fundus, extension of the head and arms can be prevented, and as the legs are born, they can be used for securing that the head rotates properly; that is, the child can be twisted round so that its front faces the mother's back. If the arms do not come down, two fingers must be passed up beside the child's body, and the arm most easily reached must be brought down first. The child's body must then be carried well forward towards the mother's abdomen, the legs being held firmly in the

right hand. Pressure on the fundus with the other hand often completes delivery. But no time must be lost at this stage, and if there is any difficulty another person must press down the fundus, while the midwife, after soaking her left hand in lotion, must slip two or three fingers into the vagina and get a grip on the child's chin, or even place a finger in its mouth, bringing the face down until one finger can be placed on each cheek bone just below the eyes. Delivery must be ended by a push over the fundus from the assistant, with a pull by the two hands, one holding the legs forward over the abdomen and the other on the face. Some prefer to set the child astride of the left forearm while the fingers of the left hand draw down the face, using two fingers of the right hand in the vagina under the pubic arch to push up the occiput and so promote flexion. The other fingers and the thumb of the right hand grip the child's neck and shoulders and draw them down. Delivering the after-coming head is the most difficult work which a midwife is called upon to do. The skill and courage required to do it neatly and successfully can only be gained by experience.

Summary of the Management of Breech Cases

1. Avoid rupture of the membranes.
2. Do not interfere until the navel is born.
3. Then pull down a loop of the cord and observe the pulsations in the cord.
4. Do not pull on the legs, but push on the fundus, so as to avoid extension of the arms and head.
5. See that the child's front goes to the mother's back.
6. When necessary, deliver quickly.

PUERPERIUM

The Normal Puerperium

Strictly speaking, the *puerperium* is the time after labour during which the reproductive organs return to their ordinary condition. This occupies in general about six weeks. The "lying-in period" is a term having a slightly different meaning, namely the time after labour during which the mother stays in bed and in her room before returning to her ordinary occupations. With people who employ a "monthly nurse" the lying-in time lasts about a month, while in the working classes it is reduced to less than two weeks. Patients are discharged from most maternity hospitals after ten days.

It was mentioned that soon after a normal labour the pulse-rate is slower than usual, namely about 60 beats in a minute. It remains slow for a day or two, and then gets a little quicker every day until, by the end of a week, the pulse beats again at its ordinary rate, which is about 80 per minute in most women.

In a perfectly satisfactory case there should be no rise of temperature during the puerperium other than the slight variations which are usual in health. But there are several causes which may produce slight rises of temperature without any actual departure from health. Such are the muscular exertion and excitement of labour, mental disturbance of any kind, distension of the breasts by milk, and neglect of proper attention to the bowels. Thus it is not at all uncommon to note a rise of a degree or a degree and a half occurring during the first few days, and lasting for a few hours.

While the uterus, just after labour, contracts and retracts into a firm, rounded mass with the fundus 1½ or 2 inches below the navel, it does not long maintain this condition. A few hours after labour it is relaxed and soft to the touch, and the fundus is found to be at or above the level of the navel. If a hand be kept on the uterus for some time, the organ will be felt to contract occasionally, just as it does during pregnancy. These contractions are not painful after first confinements, and the patient is not conscious of them. But in women who have had one or more children the cavity of the uterus is larger, and blood clots tend to collect in it. The uterine contractions expel these clots, and so are of great use. But they are felt by the patient, and are sometimes very painful. They are called "after-pains," and some patients say that they are as severe as labour pains. They can generally be relieved by rubbing and squeezing the uterus, so helping it to contract firmly and expel any clots which may be retained. The day after labour the fundus is still at or above the umbilicus, but every day after this it is found to be a little lower. Often in ten days, and sometimes in a week, the fundus descends till it cannot be felt above the pubes. At the same time the uterus becomes smaller and smaller, and this gradual return to its ordinary size is called *involution*. Though the uterus sinks into the pelvis in ten days or so, the process of involution is not complete until about six weeks after labour. The uterus should then weigh very little over one ounce, which is its ordinary weight. Involution goes on better in women who feed their babies at the breast than in those who do not. This is one of the reasons why all should be encouraged to nurse their children for a time at least.

The discharge which flows from the vagina after labour is called the lochial discharge, or simply the *lochia*. At

first it consists almost entirely of blood, and is bright red in colour. Gradually it becomes darker red, and contains a good deal of mucus. Then it becomes lighter in colour and smaller in quantity, until it assumes the appearance of the usual creamy vaginal secretion. Thus the lochial discharge goes through the same stages as the ordinary monthly period, but is more profuse and more prolonged as a rule. In many healthy patients the red colour disappears from the lochia in eight or ten days, but in some cases the coloured discharge continues for a much longer time. Like the involution of the uterus, the lochial discharge is affected by suckling the child, and it continues longer and is more free in those mothers who do not nurse.

The bowels are sluggish, indeed they may be said to be slightly paralysed after labour. They seldom move of their own accord, and they tend to become distended with wind.

The kidneys act freely enough as a rule, and plenty of urine collects in the bladder. But sometimes the patient has trouble in passing water the first time or two after labour, as the parts have been pressed and bruised and sometimes torn during labour. Occasionally the muscles round the neck of the bladder are paralysed for a time, so that the patient cannot hold water, which runs away constantly. This condition is called "incontinence," while absence of power to pass the water is called "retention," of urine. If the kidneys do not form the water, and the bladder therefore remains empty, the condition is "suppression" of urine, a much more serious matter.

The breasts begin to produce milk during pregnancy, and after labour the quantity produced increases rapidly, so that the breasts become filled, and even so tightly distended as to cause considerable pain. This free secretion of milk begins, in the majority of women, on the

third or fourth day. In some it begins earlier, and in a few later. The first milk is different in nature from that which follows. It is clearer and more yellow in colour, and is called *colostrum*. It is often a little blood-stained and the child may refuse to suck it.

Management of the Mother during the Puerperium

In normal cases the midwife's or nurse's duties to the mother consist mainly in nursing her according to modern "aseptic" rules. The patient must be washed all over once every day, her hair must be dressed, her clothing and the bed-clothes and bedding attended to, using the methods employed by nurses for securing the comfort of the patient.

The pads or napkins used for the vulva must be changed at suitable intervals, which will vary according to the amount of the discharge. The vulva and external genitals must be bathed with an antiseptic lotion (1) before each fresh pad is applied, (2) every time the patient passes water, and (3) every time the bowels are moved. During the first two days following labour, vaginal douching should not be done except when ordered by a medical man, as it may do more harm than good at this time. After 48 hours are well over, vaginal douching properly done with all antiseptic precautions can do no harm; and, if the patient likes it, she may have a douche every day, using some mild antiseptic. Years ago douching was considered useful: but now it is regarded as a harmless luxury except in cases of infection, when it is often an essential part of the treatment.

When the patient desires to pass water she should be allowed to turn over and to support herself upon her hands and knees. There is a very good reason for the use of this position during the early days of the puerperium.

For when a woman is lying on her back, the vaginal canal runs downwards from its mouth towards the uterine cervix; in other words, the opening of the vagina is its highest part. Therefore the blood from the uterus collects in the vagina, and none escapes at the opening until the vagina is full, for blood will not run upwards. Thus if the patient remains flat on her back there tends to be a pool of discharge and blood clots lying in the

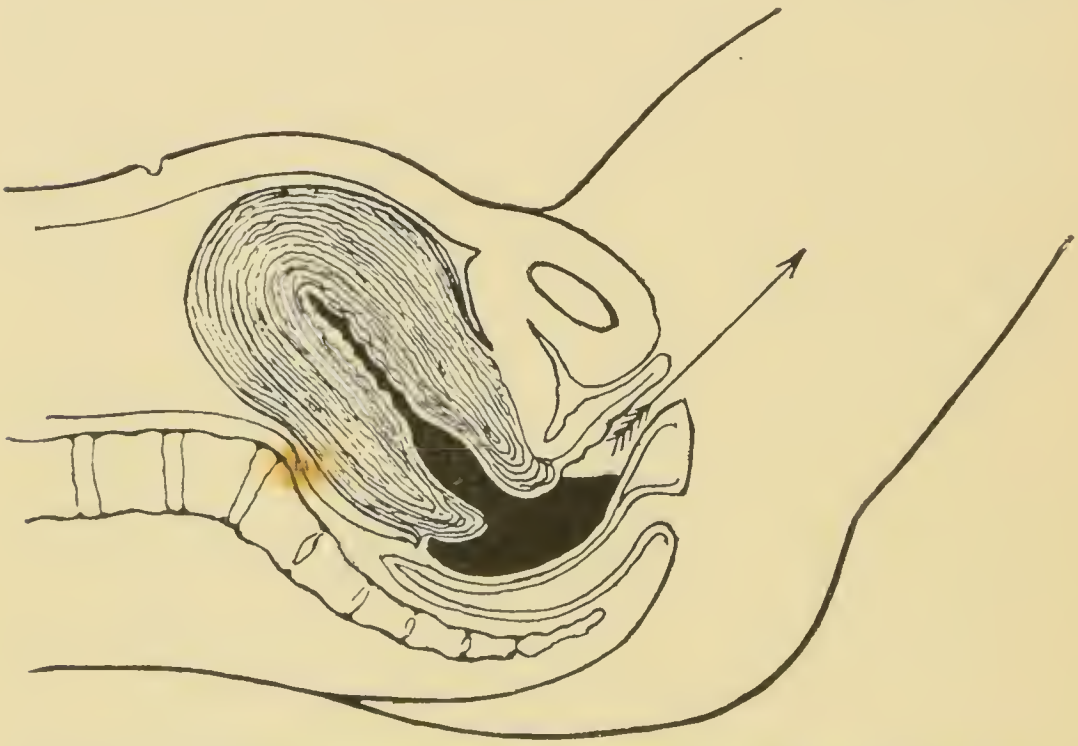

Fig. 48.—Diagram showing how the lochial discharge collects in the vagina when the patient is lying on her back. In this position, as the arrow shows, the opening of the vagina points upwards.

vagina, which is never properly emptied. But if the patient turns over on to her hands and knees, the opening of the vagina is then at its lowest part, and the clots and discharge naturally run out, leaving the vagina empty. Thus it is very good for the patient to turn over from time to time. Further, most patients pass water more easily on the hands and knees than when on the back. Again, it is bad for patients to lie too still after labour, because movements of the body favour the action of the uterus in squeezing clots out of its cavity. Lastly, the

large, heavy uterus has a tendency to be displaced backwards after labour, and this tendency to displacement is favoured if the patient lies constantly on her back. Therefore patients should be encouraged to change their position freely, and to lie first on one side and then on the other. Every time the patient turns on her hands and knees to pass water the uterus falls forward into the most favourable position, which is another reason for the use of this posture when passing water. The patient is not ill after a confinement, though she may be sore and tired for a few days, and changes of position do her no harm.

Most patients empty the bladder without trouble six or eight hours after labour. If they have no desire to do so there is no hurry. If, at the end of ten or twelve hours, a patient wishes to pass water and cannot do so, hot fomentations over the vulva will help her. It is extremely rarely that the catheter is really needed on these occasions, and it should not be used unless abdominal examination shows that the bladder is distended with urine and forms a soft swelling above the pubes, distinct from the uterus, and pushing it up in the abdomen. If the bladder is really full and is causing the patient discomfort, and if she really cannot empty it herself, the catheter may be used (see page 113). There is always a risk of causing inflammation of the bladder, and nervous patients who once have the catheter often want it again and again, so its use should be avoided if possible.

After-pains are sometimes troublesome. Being caused by the formation of clots in the uterus, they are relieved by massaging and rubbing the fundus to favour contraction and so expel the clots. Turning over to pass water favours expulsion of these clots, as before mentioned. Sedative medicines should not be given for after-pains.

The bowels should be moved from 48 to 60 hours after labour. It is inconvenient to have them moved in

the night, therefore it is a good rule to give an ounce of castor oil on the morning of the third day. Most people can take this drug easily in coffee grounds, or poured on a little sherry. Another good method is to give three grains of calomel, one grain every hour until three have been taken, on the evening of the second day, and to follow this by a saline such as a Seidlitz powder or a dose of salts in the morning. If the aperient given does not act, an enema must be given. When the delivery occurs late in the first day, the bowels may be moved on the fourth day instead of on the third. After the first motion has been secured the bowels should be moved every day. This may be managed, as during pregnancy, by the use of an evening dose of cascara, by a morning saline, by the use of an enema, or by a combination of these three methods (see page 37).

If the nipples have received proper attention during pregnancy (see page 40) they should give no trouble after labour. They should be washed with boracic lotion on every occasion before the baby is put to the breast. After the child has been fed the nipples should be washed again and then anointed with lanoline. This prevents the skin from being made wet and sodden by drops of milk which escape from the nipples between feeding-times, and so prevents cracking of the skin, a very painful and troublesome affection. If the baby cannot get hold of the nipples, glass shields fitted with rubber teats must be used, and it may be necessary to draw off the milk with a pump. If the flow of milk is scanty it can be favoured by increasing the amount of water the patient takes into her body daily in the form of drink or fluid food, such as gruel, barley water, milk, and various other "slops." If the breasts are over-distended with milk they should be supported. The flow of milk can be reduced by lessening the quantity of fluid the patient drinks, and

also by encouraging free movements of the bowels by saline aperients. If hard lumps form in the breasts they must be removed by gentle rubbing with the warm hand. The rubbing must be done from the edge of the breast towards the nipple. The natural feeding of children or *lactation* is described later (see page 157).

In cases in which the baby is dead or in which for any reason the mother is not allowed to suckle the child, precautions should be taken from the first to prevent the breasts from being distended with milk. Three measures should be taken for this purpose. First, the flow of blood through the breasts should be lessened by applying firm pressure over them. The breasts should be covered with thick layers of cotton wool, and then a binder or bandage should be applied over the wadding, so as to give firm and even pressure. Second, the amount of fluid the patient takes should be cut down. It is usually possible to reduce the patient's drinks to 1½ pints in the twenty-four hours for a few days until breast trouble is over. Third, fluid must be removed from the body by free liquid motions of the bowels. A good plan is to give a teaspoonful of Epsom-salt in a little warm water every hour until the bowels are loosely moved, and to repeat the process every morning until the breasts are soft and free from pain. Belladonna plasters should not be used. They prevent the discovery of hard lumps in the breasts and thus often lead to abscess formation. They are dirty, nasty contrivances, and do far more harm than good. Belladonna and glycerine may, however, be smeared over the breasts, which should then be covered with wadding and bandaged carefully.

After a confinement there is no reason for feeding the patient on "slops" alone. Beef-tea and the various meat extracts on the market should be avoided, as well as solid meat, fish, and eggs, until the aperient has done

its work on the third or fourth day. After this the patient may have ordinary light diet. There is a tendency on the part of nurses and relatives to overfeed lying-in women, and some patients are affected by a kind of unnatural craving for food. The difficulty is usually to prevent the patient from having too much. Extra feeding does not increase the flow of milk, and it often makes the milk disagree with the baby.

The binder which is applied just after labour gives the patient a sense of support and comfort during the first few days, when her muscles and joints are recovering from the strain of labour. After the first few days, however, the binder is of no use and should be given up. It is difficult to keep in position and often makes the patient hot and uncomfortable, while it is an extra trouble to apply a clean one whenever the lower margin gets soiled with lochia, which is constantly occurring. Many patients think that the prolonged use of the binder preserves their figure, and wear it for weeks and even for months. There is no greater mistake ; for the figure depends upon the strength of the abdominal muscles, and this depends largely upon exercise. Now, the binder takes the work off the abdominal muscles and so weakens them. In this way the binder actually spoils the wearer's chances of regaining a flat abdomen. Women who persist in wearing corsets during pregnancy and binders after confinement reduce their abdominal walls to the condition of a loose, flabby bag.

The women of the working classes generally get out of bed on the tenth or eleventh day after labour. Though they may not appear to suffer for it, many of them do so in reality. The out-patients' rooms at hospitals for women are full of people suffering from the results of getting up too soon. The womb remains enlarged, and often becomes displaced in consequence. Leucorrhœal discharge is a

frequent result. The menstrual periods are unduly prolonged and profuse, and not unfrequently troubles are caused which last throughout the woman's lifetime. Before letting a patient up, the midwife should at least make sure, by abdominal examinations, that the uterus has returned completely into the pelvis. Every woman should be kept in bed until the fundus can no longer be felt above the pubes. It is customary amongst those who employ monthly nurses to remain in bed until the middle or the end of the third week, and to spend another week in a dressing-gown, between bed and the couch or arm-chair. A short journey to the bathroom may, however, often be permitted during this week, as patients soon tire of being washed in bed, and look forward to a hot bath as a great luxury. By the middle of the fourth week there is no objection to a drive if the weather is favourable, and the patient's first walk downstairs may often be continued straight into her carriage. A good way of securing fresh air is to put on plenty of wraps and let the patient sit by the open window, where there is not more draught than when driving in an open carriage. The use of the corset should be delayed as long as possible, and for this reason patients should be kept from putting on their ordinary clothes until the last possible moment. The pressure of corsets tends to displace the womb, which remains large and heavy for over four weeks. When the stays are resumed they must be specially loose for a time.

Some patients still think their first duty on getting out of doors is to attend a place of worship to give thanks for their recovery. They could not serve God in a worse manner. Great numbers of women have lost their lives and left their families helpless through illnesses caught in places of worship thus attended while still feeble after their confinements. Public assem-

blages are generally hot, close, draughty and full of impure air, and in this respect places of worship are no better than theatres, music-halls, and lecture-rooms. They should all be avoided with equal care by those who are not in robust health.

THE NEW-BORN CHILD

Care of the Newly Born

It has been mentioned above that the cord should be cut short after being tied about 1½ inches from the navel as soon as pulsation has stopped, and that the eyes should be wiped as soon as the head is born.

It has also been mentioned that the child should be washed and dressed as soon as the mother has been made comfortable, the cord being dried, dusted, and wrapped in a suitable dressing. Further, it was said that the eyes must be carefully washed with boracic lotion, and that, if the mother has had any vaginal discharge before labour, a few drops of a mercurial lotion (1 in 1000) must be allowed to flow between the separated eyelids, so as to thoroughly disinfect the eyeball and the insides of the lids. Nitrate of silver (2 grains to an ounce of water) is often used for this purpose. The eyes must thereafter be carefully bathed every time the child is washed, and if any signs of inflammation appear, the help of a specialist in diseases of the eye should be secured. The signs are discharge, redness, swelling and a tendency to keep the eyes shut as if the light hurt them. The cord should become dry and shrivelled during the first few days. It must be carefully dried, powdered and dressed every time the child is washed. If the cord remains moist there is a tendency to infection and decomposition, so it should be bathed with a fairly strong mercurial lotion, and then with methylated spirits, before being powdered and dressed. The cord drops off sometimes as early as the fourth or fifth day, often not until the eighth or ninth day, and occasionally even later.

It leaves a small raw surface or ulcer which should remain clean and heal up quickly. Until healing is complete the use of an antiseptic dressing should be continued (see page 136).

The child generally passes water freely enough, but the urine is often strong and may cause pain and crying. During the first two or three days of life it is often very useful to give the child water, which has been sterilised by boiling, with a teaspoon several times a day. This dilutes the urine, and washes out the child's kidneys in a way which adds to its comfort.

Before the child is born its bowels contain a quantity of greenish-black slimy material consisting mostly of mucus and bile. This is called *meconium*. It is sometimes passed during labour, especially in pelvic presentations and if the child is dead or dying, when it stains the liquor amnii. The meconium is generally passed freely during the first few hours of life. It used to be the custom to give the child half a teaspoonful of castor oil to clear the meconium away, but this is seldom necessary. The first milk secreted by the mother's breasts and called colostrum is thought to have a purgative effect. Sometimes the child will not swallow the colostrum. In these cases a small dose of oil can do no harm. After the meconium has been expelled, and the child has begun to take the breast, the motions should be pale yellow in colour, free from bubbles and free from slime. Liquid at first, they gradually become more and more solid, also darker in colour.

In children of both sexes some swelling of the breasts is often noticed during the first few days. This is accompanied by the formation of a little milk. Old-fashioned nurses used to squeeze this milk out, with the result that the child's breasts often became infected and inflamed, abscess formation sometimes following. The

breasts should be carefully let alone, when the swelling will soon disappear.

During the first three days the child generally loses six or eight ounces in weight. It is said that when the cord is tied too soon, more weight is lost than when pulsation is allowed to cease naturally. The lost weight is often regained by the end of the first week, and after this there should be a steady gain in weight of five or six ounces every week for about two months. The gain should be four or five ounces a week for the third and fourth months, and three or four ounces during the fifth and the sixth months. Most children double their weight in the first six months, and treble it during the first year (Ashby).

A day or two after birth the skin of many children turns yellow. This yellowness of the skin is of no importance. It is called *icterus neonatorum*, and is said to be more marked if the cord is tied after pulsation has ceased than if the cord is tied earlier. It has to be distinguished from true jaundice, in which the whites of the eyes turn yellow as well as the skin, while the urine is coloured dark by bile and stains the napkins brown.

Most of the first two or three days is spent in sleep, and for a month or more the child will only be awake two or three hours in the twenty-four. It should be taken up only at the times proper for washing, dressing, feeding and airing. The child should have a cot of its own and should not be allowed to sleep in its mother's bed. Many an infant is suffocated to death by the body of its mother, unconscious during sleep. Apart from the risk of this accident, which is called "over-lying," the supply of air in the mother's bed is not sufficiently fresh and pure. It must be remembered, however, that warmth is very necessary for the new-born child, and it cannot always be kept warm enough in a cot by itself. Those who cannot afford to have fires in their rooms at night, and to warm

the cot with hot-water bottles, have many excuses for taking their babies to bed with them in cold weather. During the first six months, sixteen or eighteen hours of the day will be spent asleep in the cot. Ashby says: "A good meal, a warm cot, and a dark room are the best sedatives." He considers rocking unnecessary, and injurious if excessive. Children sleep much better if they have fresh air, and in fine weather they should be out of doors in the middle of the day by the end of the first week. In bad weather the child should be taken from the lying-in room into another part of the house which is warm and airy for a portion of each day.

It has been mentioned that a pure soap with no free alkali should be used for washing babies. Doctors see many cases in which mothers have produced eruptions by foolishly using carbolic and other soaps intended for floors, pots and pans. Nearly all advertised household soaps contain a large amount of soda, which accounts for their cleansing powers, but is most irritating to a child's skin. In some cases it is necessary to avoid soap altogether, using instead a handful of oatmeal tied up in a muslin bag. When a monthly nurse is employed she should wash the child all over night and morning. In the working classes the morning bath is generally the only one. The child's private parts and buttocks must be bathed, dried and powdered every time the napkin is changed, and this should be done every time the napkin is soiled and as soon as possible. This is the only way to prevent the skin of these parts from becoming sore and inflamed. A triangular piece of "wood wool" or absorbent cotton wool should be used either alone or held in position by the ordinary napkin. The wool can be burnt when it is removed. If napkins are used they should be boiled, after being washed, in water free from soap or soda, otherwise they are dried with soap or soda in them, and quickly

make the skin sore. After the cord has dropped off and the navel is healed, the child's binder has no further use. It is only employed to hold in position the umbilical dressing.

Babies' clothes should be of woollen material, and should be made to put on and take off without turning the infant over and over again time after time. The usual long clothes which mothers insist upon using are bad for the child and should be dispensed with as soon as possible.

The Natural Feeding of Infants

We have already referred to the subject of lactation, or the secretion of milk by the mother's breasts. Thus during pregnancy there is a certain amount of activity, causing darkening of the primary areola, formation of the secondary areola, and slight enlargement of the glands in its skin. The breasts enlarge, and from the fourth month on, watery secretion can usually be squeezed from the nipples. We have also mentioned that after labour the breasts rapidly fill with milk, so that the child can generally get a good supply by the fourth day, if not earlier. Further, the first milk or colostrum was mentioned as being clearer and yellower than that which comes later, and as having an aperient action on the child's bowels.

The child should not be put to the breast more than three or four times during the twenty-four hours following labour, and six times during the next twenty-four hours. It only gets a few ounces of milk during these two days. Nothing should be given to the child, however, except a few teaspoonfuls of boiled water sweetened with sugar of milk, as very little food is required at first. If the child is put to the breast too often without getting much milk, it is disappointed and it sometimes refuses to suck later, when there is plenty of milk for it. The colostrum is

sometimes blood-stained, and is often distasteful to the child. In these cases it should be drawn off with a breast-pump, or the child will become disgusted and will refuse to suck. Mothers constantly bring infants to hospital saying that the midwife says they are "tongue tied." But it is very seldom indeed that a case is seen in which the tongue is not freely movable. There are, however, occasional cases in which children really cannot suck, and in which the milk should be drawn off and given to the child with a spoon or a pipette. If the nipples do not project enough, they should be raised by applying the breast-pump just before putting the baby to them. It may be necessary to use glass nipple shields with rubber teats through which the child can suck, for a time at least. In a few days the nipples often begin to stand out better, and the child learns to take hold of them. The nipples must be washed before and after use, and should be kept anointed with lanoline. From the third day onwards the child should be fed every two hours during the day, and twice in the night. After a month the intervals should be lengthened to two and a half hours, and one feed in the night should suffice. At the end of three months the child should be fed every three hours, and a six months old infant should sleep all night without being fed. At the eighth or ninth month some artificial food should be given as well as mother's milk, and the child should then be gradually weaned.

Almost all women can nurse their own children. In a few cases, however, no milk is secreted, or the milk disappears after a few weeks. In other cases there is not enough, and some artificial food has to be given as well as the mother's milk. Some women are not allowed to nurse, because they are suffering from consumption or some other disease. If a mother has milk,

however, she should always nurse the child unless she is instructed by a medical man that she must not do so.

Artificial Feeding of Infants

Any artificial food given to an infant should be prepared so as to be as nearly as possible like mother's milk. The mixtures which we call artificial foods are used simply because there is no domestic animal whose milk is just like human milk. The milk of the ass approaches it more nearly than any other which can be obtained, and goat's milk is more like mother's milk than cow's milk. But as it is necessary to have a regular supply of fresh milk at a moderate price, cow's milk is generally used.

The cream which rises to the top of standing milk is largely composed of fat. A domestic process which shows that milk contains fat is the making of butter, which is almost pure fat.

By adding rennet or alum to warm milk, curds and whey are separated. The curd, as everyone knows, can be pressed and preserved as cheese.

If whey be boiled until it is boiled away and the pan is dry, some solid stuff is left at the bottom of the pan. This solid remnant is mostly sugar of a kind rather different from common sugar, and called sugar of milk. There is also a little of various salts.

Thus, milk mainly consists of (1) water, (2) fat, (3) cheesy material or curd, and (4) sugar.

If 5 pints, which is 100 ounces, of milk is analysed by removing the fat, turning the curd solid and drying it, and boiling off the water, it will be found to contain about 4 ounces of fat, 4 ounces of dry curd, and over 4 ounces of sugar. There is also a small quantity of salt, so altogether there is about 13 ounces in the 100 of solid stuff, and 87 ounces of water.

If mother's milk be analysed it is found to contain much more sugar and much less curd than cow's milk.

	Fat	Curd	Sugar	Salts
Mother's milk	$3\frac{1}{2}$	2	$6\frac{1}{2}$	$\frac{1}{3}$
Cow's milk	4	4	$4\frac{1}{3}$	$\frac{1}{2}$

Now, the part which troubles the infant's stomach is the curd, and the curd of cow's milk, besides being twice as much in quantity, is firmer and heavier than that of mother's milk. The quantity of curd can be reduced by diluting the milk with water. Thus, if cow's milk and water be mixed in equal parts, the mixture will contain two parts in 100 of curd, just as mother's milk does. But cow's curd is so much less digestible than mother's curd that dilution with an equal quantity of water is not enough to fit cow's milk for the new-born child's stomach, and it is usual to dilute with two parts of water to one of milk.

But when cow's milk has been mixed with twice its own quantity of water, the mixture will only contain $1\frac{1}{3}$ parts of fat in the 100. Mother's milk, however, contains $3\frac{1}{2}$ parts of fat in 100, and fat is a most important part of the child's food. Therefore to make the mixture of milk and water a proper food, fat in the form of cream must be added to the mixture.

Again, the mixture of 2 parts water and 1 milk will contain only about $1\frac{1}{3}$ parts of sugar of milk in the 100, while mother's milk contains about $6\frac{1}{2}$ parts of sugar of milk in the 100. Sugar is also a most important food, so sugar must be added to the mixture of milk, cream and water to make it a proper food for the child.

Milk from the breast is as warm as the mother's body,

98.5° F., so the child's artificial food should be given as near that temperature as possible. Mother's milk is free from germs, and the child's food should be as nearly as possible in the same condition. But cow's milk when delivered usually contains numerous bacteria. The food can of course be sterilised by boiling it, but boiling makes milk less digestible than it is when fresh. It is found that keeping the food at a temperature of 155° to 160° F. for 15 minutes sterilises it enough for practical purposes. This is called Pasteurisation, and it is best done by putting the bottle or other vessel containing the food in a pan of water, and heating the water until a thermometer shows its temperature to be 160° F.; the water must then be kept at this heat for 15 minutes at least.

When milk comes fresh from the cow it is neither acid nor alkaline, but in a few hours it quickly turns slightly acid. To counteract this change it is usual to add about ½ ounce (one table-spoonful) of lime-water to each 6 ounces of food used; a small pinch of baking soda may also be used for this purpose.

These are the broad principles which must be kept in mind in preparing artificial food for infants. As to the practical details, first, the milk used must be good, and this is best secured by dealing with a milkman of good repute who has a large number of cows. The milk is much more likely to be of good quality, and the same from day to day, when it comes from a large dairy and is really a mixture of the milk from a large number of cows. In order that the milk may be fresh it should be supplied twice a day. On arrival it should be set in a cold place, covered over to protect it from dust.

The simplest way to add the sugar is to mix it with the water which is to be used as a diluent for the milk. The sugar-water is made by dissolving 1½ ounces of sugar

of milk, supplied by a chemist, with a pint, namely 20 ounces, of hot water.

Two parts of sugar-water mixed with one part of milk (not skimmed milk) is the proper mixture for a new-born child. This is, of course, short of fat, and the deficiency may be corrected by adding cream in the proportion of one teaspoonful of cream to every six ounces of the food. The cream must be skimmed from the top of milk set up for the purpose, as cream separated by the machines called "separators," and sold in jars, is not suitable for this purpose.

Another way of securing a proper amount of fat in the food is to use what is called "top milk" instead of ordinary milk. Suppose a pint of milk is set up for three or four hours in a clean jug, the cream from the whole pint of milk will rise to the top of the jug. Now, if the upper half of the milk be used with all the cream, this "top milk" will contain twice as much cream as ordinary milk. The top milk can be separated by using a syphon —a bent glass tube—for drawing off the lower half-pint of milk without disturbing the upper portion. Or the lower portion can be run off by a tap fixed in the bottom of a jug made for the purpose. In either case the child gets the cream of twice the quantity of milk which is used for making its food.

With the addition of a little lime-water or a pinch of soda, and after being kept at 160° F. for 15 minutes and then allowed to cool to 100° F., the mixture is ready for use.

The old-fashioned bottles with long tubes should not be used, as it is practically impossible to keep them clean. The tubes become lined with a coating of food which is full of bacteria, and these infect the fresh food and turn it sour very quickly. The bottles used should be fitted with short rubber teats which can be turned

inside out and easily cleaned. The teats and the bottles should be frequently sterilised by boiling; two or more bottles should be kept in use, and between feeding times they should lie in boracic lotion.

At birth the child's stomach will hold less than 1 ounce; at a month old it will hold about $2\frac{1}{2}$ ounces; at three months, 4 ounces; at six months, 6 ounces; at eight months, 8 ounces. The quantity of food to be given at one feeding is thus very small at first, but quickly increases.

The small meals given at first disappear from the child's stomach in from an hour and a half to two hours, which is the reason for feeding every two hours during the first month or so.

Ashby says that the following are the amounts of food to be given for a healthy infant:—

Under a week	10 feedings	1 oz.	every	2 hrs.	= 10 oz. in 24 hours.
2 wks. to 4 wks.	10 ,,	$1\frac{1}{2}$—3 oz.	,,	2 hrs.	= 15—30 oz. in 24 hours.
4 wks. to 3 mos.	9 or 8 ,,	3 —$4\frac{1}{2}$ oz.	,,	$2\frac{1}{2}$ hrs.	= 22—36 oz. in 24 hours.
3 mos. to 6 mos.	7 ,,	4 —$5\frac{1}{2}$ oz.	,,	3 hrs.	= 28—38 oz. in 24 hours.
6 mos. to 9 mos.	6 ,,	$5\frac{1}{2}$—7 oz.	,,	3 hrs.	= 33—42 oz. in 24 hours.
9 mos. to 12 mos.	5 ,,	$7\frac{1}{2}$—9 oz.	,,	$3\frac{1}{2}$ hrs.	= 37—45 oz. in 24 hours.

As the child gets older the food should be made stronger, more milk and less diluent being used, until at last the child can drink pure milk undiluted.

Summary of Artificial Feeding

1. Get good fresh milk, and keep it cool and free from dust.
2. Dilute the milk to reduce the proportion of curd.
3. Add sugar of milk to restore the proper proportion of sugar.
4. Add cream to restore the proper proportion of fat.
5. Sterilise the mixture by heat.
6. Neutralise acidity with soda or lime-water.
7. Give the food properly warmed.
8. Feed at regular times.

9. Give proper quantities.
10. Use suitable bottles.
11. Keep the bottles clean.
12. Do not make the food long before it is wanted.

It must always be remembered that no two children are exactly alike, and that it is constantly necessary to make variations in the composition of the food, and in quantities and times of feeding. The study of books and figures is useless without experience and care, and above all, thought. The baby's bottle must, in fact, be "mixed with brains," like so many other things. For example, if a child throws up curds after being fed on the mixture above described, barley-water may be used as a diluent for the milk instead of the plain sugar-water mentioned above. About 15 minutes after reaching the child's stomach, mother's breast milk curdles into a light curd such as infants posset up when they have swallowed too much. But cow's milk quickly forms a heavy, thick curd such as is often seen when children vomit after having the bottle.

Barley-water is used in order that the fine particles of barley may prevent this curd from being so quickly formed, so heavy and so indigestible. The barley itself is not of any use as a food to young infants; its value is simply due to the mechanical action of the particles in breaking the curd. The barley-water generally used is much too strong. The proper way to make it for this purpose is to take one teaspoonful of pearl barley, and, after washing it, to let it stew in a pint of water for three or four hours. Water should be added to keep the quantity up to a pint. After straining, the usual 1½ ounces of sugar of milk is added to the barley-water, which is then used to dilute the proper quantity of milk for each bottle. The particles of barley, besides lightening the curd, have a slight irritating or stimulating action on the child's bowels.

If these are loose, less barley should be used, or rice-water may be employed. If the bowels are constipated, stronger barley-water or oatmeal-water may be used. Some nurses use brown sugar for constipated children, for the sake of its stimulating action on the bowels.

The use of condensed milk is very common amongst the poorer classes. Most of that which is sold is made from skimmed milk, and is thus very poor in fat. In order to preserve the milk, a good deal of sugar is usually added; but this does not matter so much as the lack of fat, because mother's milk is rich in sugar. Condensed milk is pure enough and is free from germs, and if a kind is secured which contains plenty of cream, it is a safer and better food for infants than the impure and poor milk which is supplied to the poor in many large towns, especially in hot weather when milk quickly turns sour. The proper proportion for the new-born is one part of condensed milk to nine parts of water. But a further word of caution is required. The proper food of infants is fresh milk, just as the proper food of adults should contain fresh meat, fresh vegetables, fresh fruit. In the old days, when sailors were fed entirely on biscuit and preserved foods, the disease called scurvy was terribly common, and it has only been banished by the use of fresh food, supplemented with lime-juice, on ships. Children fed entirely upon condensed milk, or upon the various prepared foods now so widely advertised, tend to suffer for want of fresh food in a way which recalls the troubles of the victims of scurvy. The little sufferers from want of fresh milk are, as often as not, the children of rich people who spare no money or trouble, but who imagine that expensive preserved foods out of tins will keep infants in health. The children of the poor, even when fed on condensed milk for months together, often escape these troubles; for their mothers are not so careful as the nurses of the rich, and they allow their infants to suck raw

bananas, oranges and other fruits, which supply, in some degree, the fresh stuff required to keep them in health.

Children, it will be understood, should not be kept on condensed milk or on prepared foods for many weeks at a time. No person, whether doctor, midwife, or nurse, will succeed in the management of children who cannot learn by experience to feed any child which is not actually ill, on fresh milk mixed with one or other of the diluents in common use. The variations which may be introduced are numerous. Thus the proportions of milk and diluent may be changed, making the food stronger or weaker. More or less fat may be given by varying the amount of cream added. The times may, of course, be varied, and the quantity given at each feed can be controlled. The diluent may be varied in strength and also in kind. Any child which does not thrive on a good mixture, varied from time to time as circumstances direct, should be placed under the care of a medical man without delay.

Here we conclude our account of the work which midwives and maternity nurses are called upon to undertake, namely, the management of normal labour and the care of the mother and child during the puerperium, when both are in health.

PART II

In the first lecture it was stated that midwives have two chief duties. The first is to protect their patients from the dangers of puerperal fever. The second is to secure medical assistance for their patients in all conditions which endanger health or life, whether due to disease, to personal peculiarity, or to accidental circumstances. In order to carry out this second duty, some knowledge of these conditions is necessary, and the more important are briefly described in the second portion of these lectures, with those signs and symptoms which give warning of their occurrence.

ABNORMAL PREGNANCY

Disease during Pregnancy

The ordinary diseases of daily life can attack pregnant women just as they can other persons, and there are numerous chronic diseases which do not prevent pregnancy. So we meet with pregnant women who were ill before being pregnant, and others who have become ill since the beginning of pregnancy. These women should all be under the care of medical men, unless their troubles are very slight. The presence of any disease may interfere with the progress of pregnancy, and also pregnancy may make the disease more serious than it would otherwise be. Therefore medical assistance should be secured for a pregnant woman in troubles not serious enough to require the attendance of a medical man at other times.

Conditions of Importance during Pregnancy

Tuberculosis.—Consumption or phthisis should receive special attention, because it rapidly advances, especially after the end of pregnancy, and because it is so infectious that it can easily be communicated to children. The tubercle bacillus, which, in the lungs, causes phthisis, is also the cause of disease in other parts of the body, such as hip-joint disease, "consumption of the bowels," enlargement and abscesses in the glands of the neck. Tubercular patients should not marry. If married, they should avoid pregnancy. If they have children, they should not feed them at the breast.

Syphilis.—Midwives and nurses should know some-

thing about this disease. Women are infected with syphilis, or the "bad disorder," by contact with husbands who have the disease. It begins with a slowly healing sore, an ulcer which is painless and does not itch. This sore is generally in the external genital organs, but it may form on the lip, or inside the mouth, after kissing a person suffering from syphilis. Doctors and nurses sometimes get the disease by touching the mouths or genitals of syphilitic patients with a finger whose skin is scratched or cracked. The sore then forms in the situation of the crack. This first stage of the disease ends in a few weeks, and the sore heals, but the disease is by this time general, "in the blood," as people say. There is slight fever and headache, there is long-continued sore throat, various rashes appear on the skin, and the hair drops out. Without treatment, these symptoms of the second stage may last for many months, during which the patient may give the disease to any other person.

The third stage may be delayed for years, and consists in the formation of diseased masses in various parts of the body, often in the brain. Though patients in this late or third stage cannot give the disease directly to other people, they can communicate it to their children if they have any born alive while suffering from the disease.

Sometimes we see cases of syphilis in the second stage during pregnancy, when the rashes and other symptoms are generally unusually severe, and abortion generally occurs. More frequently we see cases in which the father has had syphilis, it may be years before, and is supposed to be cured. The mother in such cases has no primary sore, and seldom complains of fever, sore throat, rashes, or falling out of the hair. But she has abortions, one after another. Very often each pregnancy goes on longer than the last, until the fourth or fifth child is born at full term,

but is dead. The next child may be born alive, but probably dies of syphilis in a few weeks. The next may live longer, and if the early signs of syphilis are seen and treated, the child may survive. At last children may come which grow up without showing any sign of the disease.

These disagreeable subjects are mentioned for two reasons. Firstly, the midwife or nurse must be on the alert to protect herself from getting the disease through the injured skin of a finger. Also she should prevent the patient from infecting other persons. A syphilitic child cannot infect the nipple of its own mother, but it may infect that of another woman, so these children should never have wet nurses. Secondly, when a woman has several abortions one after another, she should be advised to consult a medical man in order that the cause may be discovered and properly treated. It is hardly necessary to say that suspicions as to the existence of syphilis should never be mentioned to the patient, or to any person except the medical man engaged in the case. The same remark applies to the condition next considered.

Gonorrhœa.—This is another disease conveyed to women by their husbands. In the early and acute stage it causes pain, redness, and swelling of the vulva, smarting pain on passing water, and profuse vaginal discharge. In its later or chronic stage it is the cause of many serious disorders of the reproductive organs which ruin the health, often prevent pregnancy, and often cause death. If a woman gets this disease during pregnancy, the acute stage is very severe. When she has passed the acute stage before the beginning of pregnancy, there is often a profuse vaginal discharge. There are two things to be remembered. First, the children of gonorrhœal women are almost sure to get some of the germs of the disease into their eyes during their birth. This causes

gonorrhœal ophthalmia, unless the child's eyes are carefully disinfected with perchloride or bin-iodide of mercury (1 in 1000). Any discharge from these patients, if conveyed to the eye of nurse or doctor, patient or child, or any person in the house by either soiled towels, or in any other way, will set up a violent inflammation which may end in blindness. Second, there is a form of puerperal fever seen in these patients, the germs of the disease which have lurked in the uterus during pregnancy becoming active again after labour. The treatment of all cases of vaginal discharge during pregnancy or labour should therefore be directed by a medical man, and all precautions should be taken to protect everyone concerned from infection. As above mentioned, suspicions as to gonorrhœa must not be expressed except to the medical man.

Diseases of the Heart naturally demand attention during pregnancy ; but their most serious results are seen during and just after labour.

Diseases of the Kidneys are of special importance during pregnancy, because of their connection with the occurrence of eclamptic convulsions during pregnancy, labour, and the puerperium.

Jaundice and all diseases of the *liver* are important for the same reasons, and because that disease called acute yellow atrophy of the liver, which kills in a few days, is oftenest seen during pregnancy.

Various Nervous Diseases are common in pregnant women, if indeed they are not actually caused by it. Amongst these are a form of blindness, St Vitus' dance, the mental depression called melancholia, and the mental excitement which in its worst form is mania or madness.

Pelvic and Abdominal Tumours.—There are many tumours of the uterus and some tumours of the ovaries

which do not prevent pregnancy, but may cause great difficulty in labour, and may make delivery impossible except by surgical operation. Unfortunately these tumours are often discovered only during labour, but any midwife or nurse who discovers the existence of a lump in the abdomen or in the pelvis which is not the pregnant uterus, should of course send the patient to a medical man in order that arrangements may be made for the removal of the tumour before labour, or for proper assistance at full time, as may be required.

Recognition of Pelvic Deformity

Smallness or deformity of the bony pelvis is recognised in two ways. First, by the history of previous difficult confinements; and second, by measurement of the pelvic diameters. If a woman has had one or more confinements in which the children were delivered dead, by means of instruments, or by the other methods of artificial interference, it may be taken for granted that the pelvis is peculiar in some way. It is possible to go further and say that medical advice is necessary for any woman who has had labours at full time, none of which have ended naturally.

In first pregnancies there is no history of previous difficult labours, but the appearance of the patient may suggest difficulty to come. All very small women are likely to have small pelves, while they often have full-sized children. Any deformity, such as hunchback or shortness of one leg, will attract attention and suggest pelvic deformity, as will lameness caused by hip-joint disease during childhood. Patients with these and other easily seen deformities of the back and legs should of course be referred to a medical man. But there are many women of fair size who look quite ordinary in their

clothes and who still have contracted pelves. Of these cases the most common are those with narrowing of the true conjugate by flattening of the pelvis from back to front. This is due to softening of the bones by rickets in childhood. An extra forward curve of the spine at the waist often indicates this deformity. Looking at the lower part of the back after removing the clothes, the

Fig. 49.—Dwarf delivered by Cæsarean section by Dr Lloyd Roberts.

sacrum may be found to slope much more than it should in a well-formed woman. Measurement will generally show that the interspinous diameter is as large as, or larger than, the intercristal, instead of being an inch smaller, and that the external conjugate is less than 8 inches.

Midwives do not carry callipers for taking these measurements, but a good deal can be learnt by simply looking at the lower part of the back, and noting the position of the posterior iliac spines which is generally

marked by two dimples. These should be 4 inches apart, and the spine of the last lumbar vertebra should be about 1½ inches above the line joining the dimples. These three points form a triangle.

If there is narrowing of the pelvis, the dimples may be too near together, when the triangle looks narrow. In some cases of flat pelvis the fifth lumbar spine is lower

Fig. 50.—Hunchback, caused by tubercular disease of the spine during childhood. The abdomen is prominent because of the narrowness of the pelvis, which will not admit any part of the child. Delivered by Cæsarean section.

than usual and the dimples may be farther apart than usual, so that the triangle they form looks broad and flat.

Other indications of deformity are narrowness of the pubic arch and nearness together of the ischial tuberosities, which should be 4 inches apart. Sometimes the sacrum can be felt to be too much curved forward, so that its tip is too near the pubic symphysis. The coccyx is sometimes firmly fixed to the sacrum, so that it cannot be pushed backward during labour, and if it is

fixed in such a way that it projects forward it may prove a serious obstacle to delivery.

If, during vaginal examination, it is found possible to touch the sacral promontory, it may be regarded as certain

Fig. 51.—This patient is considered to have a very "elegant" figure; but, on removing her clothes, it is seen that her sacrum slopes much more than it should, and that the external conjugate is very small.

that the true conjugate of the brim is small, and that there is contraction of the brim.

If possible, pelvic deformities should be discovered during pregnancy, so that advice may be taken and arrangements made in good time. Unfortunately they are often discovered only when labour has been going on for a long time, and when the signs of "obstruction" appear.

Fig. 52.—This patient has a disease called osteomalacia, very rare in this country, which softens the bones. Note that the lower ribs have sunk below the iliac crests, and that the sacral region has lost all its shape. (Compare Fig. 26.) Cæsarean section by Sir W. J. Sinclair.

Abnormal Conditions caused by Pregnancy

Toxæmia is a name given to various conditions in which some poisonous substance is circulating in the blood. There is a group of troubles which are common in pregnancy, and which are not associated in the same way except in pregnancy. They are caused by the presence of poisonous substances in the blood, though we do not know what these are. The most serious and important of these troubles is the condition known as Puerperal Eclampsia, in which convulsions and unconsciousness occur before, during, or after labour. In order that this serious trouble may be avoided by proper treatment of the state which leads up to it, midwives and nurses should be familiar with the symptoms and signs of disease of this kind. The morning sickness of early pregnancy is probably one of these symptoms, but as it is so common, and as it generally disappears before the end of the fourth month, it is not considered as of any importance. But if vomiting is excessive, and if it continues after the fourth month, it may be very serious. It must be remembered that any of the ordinary causes of vomiting may be at work during pregnancy, and also that a kind of nervous or hysterical vomiting often goes on right up to the time of labour without doing much harm. The true "excessive" or "pernicious" vomiting of pregnancy is different. The patient is unable to take nourishment, she becomes sleepless, and may be mentally affected. Persistent headache, dimness of sight, sudden blindness, swelling of the limbs, face and body are other symptoms of toxæmia. In most cases there is disease of the liver and of the kidneys, caused by the poison in the blood. The nature of the urine is changed, and it often contains albumen. Testing the urine is no part of the business of midwives and nurses, but it is well for them to know that albuminous

urine turns cloudy if boiled. It contains a substance like white of egg, which also turns white and solid on boiling. The various symptoms of toxæmia do not all occur in every case, but the presence of any of them demands the attention of a medical man.

Displacements of the Pregnant Uterus.—Soon after the end of the fourth month a patient sometimes finds that she cannot pass water, and her discomfort quickly becomes very great. On examination the abdomen is found enlarged by a swelling which is the distended bladder, and, on vaginal examination, the pelvis is found to be filled by a solid mass which is squeezing the water passage or urethra against the pubic bones, so as to prevent the flow of urine. Occasionally the mass in the pelvis may prove to be a tumour, but generally it is found to be the body of the pregnant uterus displaced backwards, or, as it is called, *retroverted*. The uterus, as it grows too large for the pelvis, should rise up into the abdomen, and it usually does this as soon as the fourth month is over; but it may get caught below the promontory of the sacrum and may remain in the pelvis, where it continues to grow, and interferes with the bowels and bladder until finally the patient cannot pass water. If the patient is not relieved by the use of the catheter the bladder becomes more and more distended, until the water begins to dribble away, a few drops at a time. The urine remaining in the bladder decomposes, and the bladder may finally burst, with fatal result. Abortion often occurs, and then specially careful treatment is required. If a patient is unable to pass water, or if her water dribbles away, she should see a doctor. He will find out the exact nature of the condition, and, if the uterus be retroverted, he will adopt some means for raising it up out of the pelvis into the abdomen.

Women who have falling or *prolapse* of the womb sometimes become pregnant, and the womb, growing larger

and heavier than before, comes lower down. Abortion is likely to occur if the condition is not relieved by pushing the uterus up into its proper position and supporting it there by a suitable instrument. After mid-term the uterus gets too large to come down, and the use of the support can be given up.

Results of Pressure.—The growing uterus presses upon

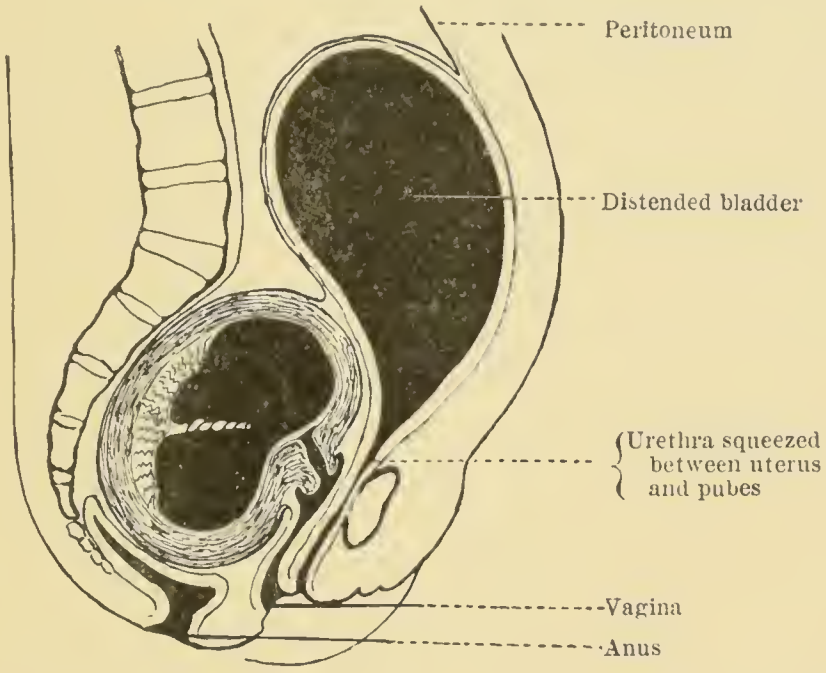

Fig. 53.—Diagram to show how first incontinence and then dribbling of urine are caused in backward displacement (retroversion) of the gravid uterus when the uterus remains caught in the hollow of the sacrum.

the blood-vessels and other structures in the lower part of the body and may thus cause various troubles. Amongst these is swelling of the legs, apart from heart or kidney disease. A more troublesome result of pressure is swelling or varicosity of the veins in the lower limbs, in the vulva, in the rectum, and round the anus.

Varicose veins in the legs are often first noticed during pregnancy. They may get better after labour, but return in a worse form during the next pregnancy. To prevent the condition from getting worse and worse, the legs

should be bandaged from the foot upwards, with the patient lying down, every morning until labour is over. The bandages should be worn all day. Varicose veins in the labia majora and vulva often cause much pain and discomfort, as it is impossible to bandage them. Sometimes they can only be treated by keeping the patient lying down for months, it may be until the end of pregnancy. Occasionally these veins burst and cause free bleeding. Not long ago a woman bled in the streets of Leeds so quickly that she died as she reached the hospital. She was near the end of pregnancy, and the autopsy showed that the bleeding had occurred entirely from a varicose vein in the vulva. Varicose veins round the anus and in the rectum are called piles. They may become inflamed and cause intense suffering, and may also bleed freely.

Hæmorrhage during Pregnancy

It must be remembered that menstruation may occur once or twice after the beginning of pregnancy. Rarely there is hæmorrhage due to tumours. Bleeding can also occur in some cases of pregnancy outside the uterus. In the great majority of cases, however, bleeding during pregnancy is a sign of abortion. Late in pregnancy bleeding may be caused by separation of a normally situated placenta (when it is called accidental hæmorrhage), or by the separation of a placenta prævia (when it is called unavoidable hæmorrhage). These will be described later (see page 204) as complications of labour

Miscarriage or Abortion

Miscarriage is the term used by the public for the interruption of pregnancy. Abortion means miscarriage before the child is old enough to live apart from the mother. Children born before the twenty-eighth week,

that is before the end of the seventh month, practically never survive; children born after this time may live, and they are said to be "viable." Premature labour is labour before full time but after the seventh month (see page 246). Midwives do not undertake the treatment of abortions, but they should understand their nature and varieties.

The chief symptoms of abortion are pain and bleeding, and these symptoms should always receive careful attention. Commencing dilatation of the cervix is the important sign that abortion is **threatened**. According to the amount of the bleeding, and the degree of dilatation of the cervix found on vaginal examination, medical men decide whether abortion is **inevitable** and certain to occur, or whether it is only threatened.

In a **complete abortion** the whole ovum comes away together with the decidual lining of the uterus. It was explained (page 27) that, up to the end of the third month, part of the uterine cavity remains as a space between the decidua vera lining the uterus, and the decidua reflexa covering the portion of the ovum which is not attached to the uterine wall. Thus in an abortion before the end of the third month the following things must come away. The decidual lining of the uterus, formed of decidua vera and decidua serotina; the decidua reflexa; the chorion, more or less shaggy all over; the amnion and the fœtus. If any of these things are left in the uterus, the abortion is said to be **incomplete**. The part most often left is the decidual lining of the uterus (vera and serotina). This often comes away as a three-cornered bag or sac after the expulsion of the ovum.

After the end of the third month the decidua reflexa unites with the decidua vera, the uterine cavity no longer exists. Abortion is then rather simpler, for the decidua is thinner and forms one more or less uniform layer, instead of

being double in part. The embryo or fœtus must come away with the placenta, amnion, and chorion, with a thin decidual layer covering them. The importance of all this is very great, because after complete abortion a patient is just as safe as after normal labour, while after incomplete abortion she is in great danger of septic infection and fever. For the portions of the ovum and decidua left in the uterus are dead animal matter, germs of putrefaction quickly reach

Fig. 54.—Fleshy mole, outer or uterine surface. The patient expelled this mass after nine months' amenorrhœa. The ovum is of about four months' growth, and was thus retained in the uterus dead for about five months.

them and the discharge begins to stink. The patient soon has a rapid pulse and a high temperature. She may have shivering fits (rigors), and the attack of fever which follows may end her life.

Every blood clot or shred of tissue which an aborting patient passes should be kept for inspection by the medical man. He will have to satisfy himself that everything has come away. If he can see every portion of the ovum, he will be spared the necessity of putting the patient to the

inconvenience of what is practically a surgical operation, namely, making sure with his own finger that the uterus is completely empty, after dilating the cervix with instruments if necessary.

Sometimes the ovum dies without being expelled. There need be no bleeding nor pain. If the mouth of the womb remains closed, the dead ovum may remain without becoming infected and decomposing for

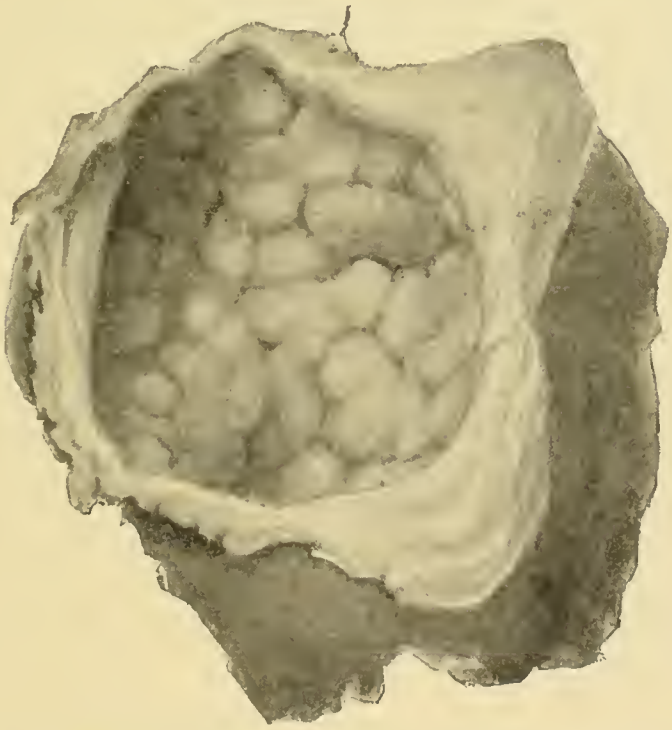

Fig. 55.—Fleshy mole, cut open to show amniotic cavity. The fœtus has been absorbed.

many months. It comes away sooner or later with the symptoms of abortion. This is called **missed abortion.** A compact mass composed of the ovum and decidua with more or less blood clot is expelled, sometimes with considerable bleeding. These masses are called "moles," and pregnancies which end in this way are sometimes called molar pregnancies.

There is another variety of **molar pregnancy** in which the chorionic villi are turned into small cysts which look like white currants floating in red currant

jelly. In these cases the uterus enlarges in size more quickly than usual, and is softer to the touch than it should be. There are irregular bleedings, and sometimes the small rounded cysts can be seen in the blood clot which escapes. Finally the mass is expelled, but it is seldom complete. These cases require particularly careful treatment on account of the serious results which may

Fig. 56.—Uterus containing vesicular or hydatid mole. (Mr Favell's case.) Part of the uterus has been cut away to show the contents.

follow. The condition is called Hydatid Mole, or Vesicular Degeneration of the Chorion.

Pregnancy outside the Uterus

Extra-uterine or Ectopic Pregnancy.—Every nurse and every midwife should know that the growing ovum occasionally remains in one of the Fallopian tubes instead of entering the cavity of the uterus. The thin-walled

tube is seldom able to resist the pressure of the enlarging ovum, and it generally bursts a few weeks after conception. When this occurs there is bleeding, and the blood generally flows into the abdominal cavity. Sometimes the bleeding is so quick and so profuse that the patient dies in a few hours, if no one is at hand who recognises the need for immediate surgical treatment.

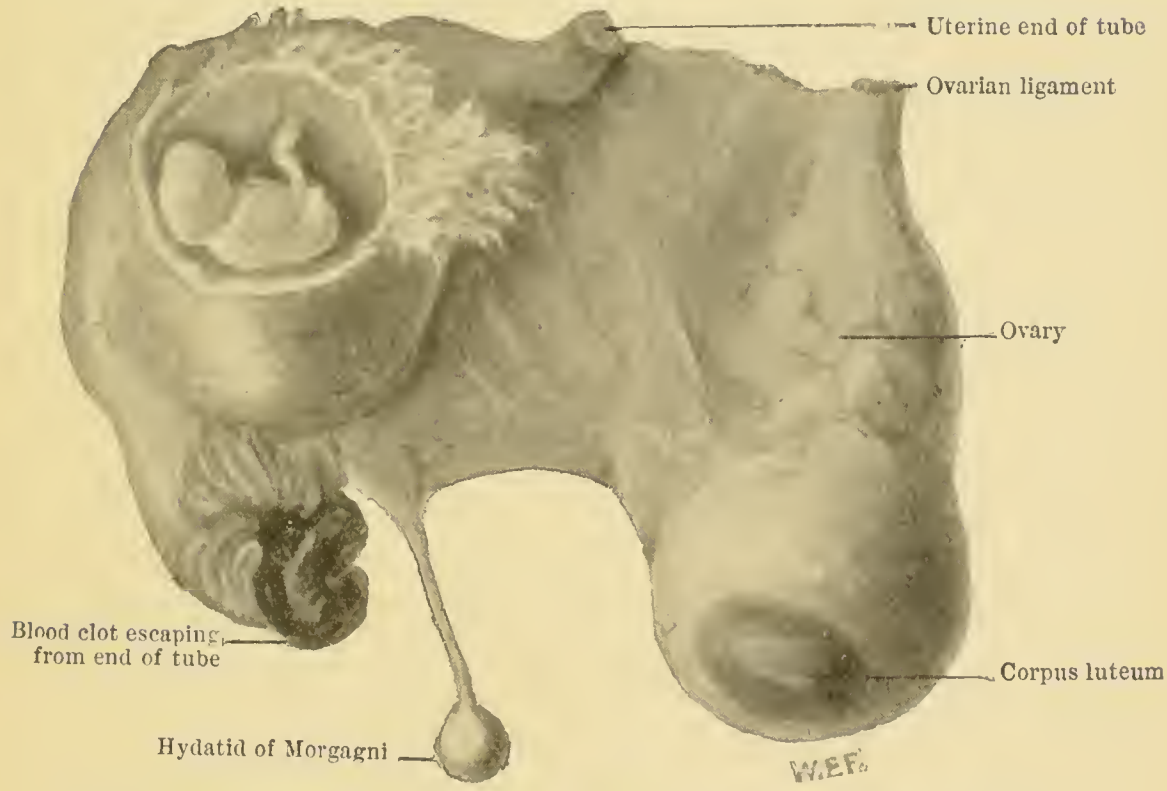

FIG. 57.—Pregnancy in the tube. The tube burst and the patient almost bled to death. The tear has been enlarged and trimmed to show the amniotic cavity containing the fœtus. Chorionic villi show to the right of the ovum.

Generally the patient does not know that she is pregnant. She may or may not have missed a period. She may or may not have had irregular bleeding from the vagina. Suddenly she is attacked with violent pain in the abdomen, often so severe as to cause fainting. The pulse now begins to get quicker and quicker, so that within five or six hours from the beginning of the pain it may be impossible to count it. The face gets paler and paler,

the insides of the eyelids become white, the lips and gums lose all colour. The patient then begins to gasp for breath and soon dies. Not a drop of blood need escape from the vagina. At operation, or after death, the blood is found filling the abdomen.

ABNORMAL LABOUR

DELAY AND OBSTRUCTION

Delay and Obstruction in Cases of Head Presentation

Delay in the First Stage of Labour.—Labour may be slow in the first stage owing to—

1. Faults in the powers or forces of labour.
2. Faults in the passages to be dilated.
3. Faults in the presenting part which make it less serviceable as a dilator than usual.

1. *Faults in the Powers.*—In the first stage the uterus acts alone and its contractions are the only force at work. If the pains are few and far between, weak and irregular, dilatation goes on slowly. This inactive, sluggish, or lazy state of the uterus is called uterine *inertia*—or sometimes **primary uterine inertia**.

2. *Faults in the Passages.*—The parts dilated during the first stage are the cervix and the lower uterine segment. In some persons the **cervix** is very **tough** or **rigid** and is only dilated with difficulty.

In first confinements, the older the patient the longer will dilatation take as a rule. Sometimes the muscles of the cervix and lower portion of the uterus do not relax properly when the upper portion of the uterus contracts. This is called **spasmodic rigidity** of the cervix.

Sometimes the fœtus lies in the wrong direction for entering the pelvis, the uterus hanging forward unduly through flabbiness of the abdominal wall. This condition

is called "**pendulous belly**." It should be treated by making the patient lie on her back, so that the uterus falls back against the spine, in its proper position. The head can then enter the pelvis and labour goes on. It is also useful to apply a tight abdominal binder.

3. *Faults in the Passenger.*—If the membranes rupture

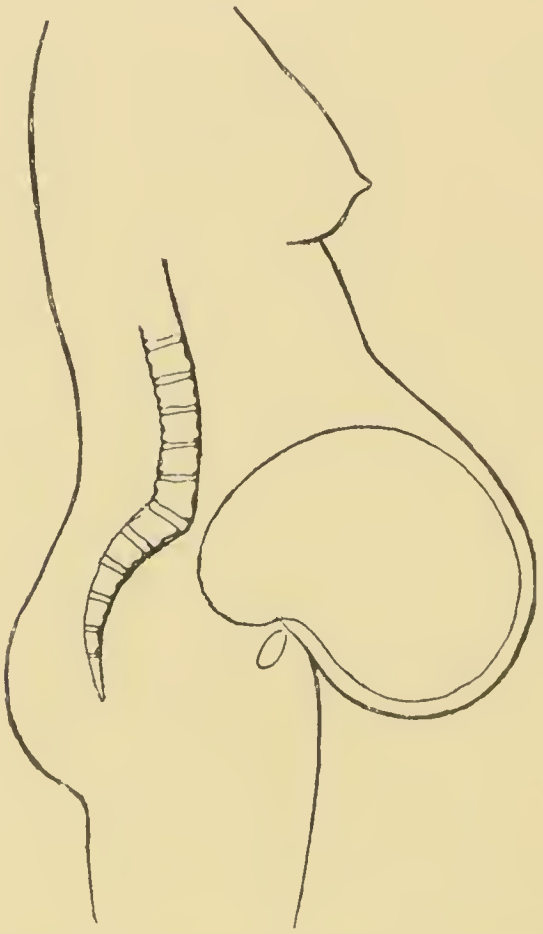

FIG. 58.—Diagram to show the position of the uterus in "pendulous belly." When the uterus contracts it drives the fœtus against the promontory instead of into the pelvis.

early, there is no bag of fore-waters in front of the presenting part. This is a great disadvantage, and prolongs the dilatation stage considerably. Labours which are slow on account of early loss of the waters are called "**dry labours**," and they are very trying to the patient and her attendant.

Again, some presenting parts are not as good dilators as others; the breech, for example, does not dilate the

cervix so well as the head. The first stage is likely to be slow in all cases of **irregular presentation**, and whenever the presenting part is too large to descend into the pelvis, or "engage," as it is called.

Sometimes there is so much liquor amnii that the **uterus is stretched or distended** (Hydramnios). Then it cannot contract so well as usual and the first stage may be unduly prolonged. Distension of the uterus by twins may have the same result.

Summary of Causes of Delay in the First Stage

I. **Faults in Powers.**	Primary uterine inertia.
II. **Faults in Passages.**	1. Rigidity of cervix.
	2. Spasmodic rigidity.
	3. Pendulous belly.
III. **Faults in Passenger.**	1. Deficiency of liquor amnii (dry labour).
	2. Mal-positions and mal-presentations.
	3. Distension by twins or by hydramnios.

Delay and Obstruction in the Second Stage of Labour.—This may be considered under the same headings used in describing delay during the first stage.

1. *Faults in the Powers.*—The forces of labour during the second stage are now the uterine contractions, together with the contractions of the abdominal and other muscles. As before, there may be **primary uterine inertia**, and there may also be weakness of the other muscles. Sometimes this is due to a want of will on the part of the patient, who refuses to bear down and help herself. Sometimes the uterus becomes worn out and the pains become weaker and fewer. This is called **secondary uterine inertia**. In primary inertia the uterus is lazy, in secondary inertia

it is tired. After the patient has had rest and sleep the pains generally return and labour can then be completed. These causes make labour slow, but they do not wear out the patient, so they are not so important as those mentioned below.

2. *Faults in the Passages—Perineum and Vagina.*—The **vagina** may be narrow and rigid, but the common cause of delay is **rigidity of the perineum**. Very often, indeed, the head descends on to the perineum and remains there, stopped by the narrowness of the vaginal outlet. It takes a long time in some cases for the perineum to soften and for the vaginal opening to be dilated sufficiently to allow the escape of the child, and this is one of the most frequent causes of prolonged labour. Patience is necessary, but it is not wise to wait too long, as the child's head is under pressure during every pain ; and when the second stage has lasted about two hours, the perineum does not soften any more. It will probably tear at last in any case. Therefore when the head descends on to the perineum and is definitely stopped there, help should be secured without unnecessary delay.

Distension of the **bladder** by urine, and of the **rectum** by fæces, are also causes of delay. They should be corrected by the use of the catheter and the enema if necessary. If difficulty is found in passing the catheter, the patient should be put in the knee-chest position. The head then falls away from the brim, and the catheter slips easily between the head and the pubic symphysis (see page 225).

Tumours of the **ovaries** or **uterus** are sometimes discovered during labour blocking the pelvis. In these cases surgical operations are required unless it is possible to push the tumour up into the abdomen, so making room in the pelvis.

Abnormal Pelvis.—Contraction of the pelvis is one of

the most serious causes of delay in the second stage. With a small or deformed pelvis it is often impossible for the child to be born alive, and sometimes it cannot be born at all except by the surgical operation of Cæsarean section, in which the child is delivered through wounds cut in the abdominal wall and in the uterine wall. Some of the signs of pelvic contraction have been mentioned above (see page 173), as the existence of these deformities should be discovered before labour whenever this is possible. A deformed woman who is in labour *should not be examined by the vagina*, as vaginal examination before a Cæsarean operation greatly increases the risk to the patient, by making infection more likely to follow.

Obliquity of the Uterus and Pendulous Belly are causes of delay which act during the first and second stages of labour. If they cause delay after dilatation is complete, the patient must be kept on her back and a binder may be applied with advantage.

3. *Faults in the Passenger.*—A very **large head** will not go through an ordinary pelvis any more easily than a head of ordinary size will go through a small pelvis. Thus unusual size of the child is a cause of delay, and it may be of complete obstruction.

It was mentioned above (see page 92) that the fœtal head is moulded or altered in shape during labour in such a way that it fits the pelvis more easily. Sometimes the child's head is hard, owing to the bones being more completely formed or ossified than is usual. In these cases the head cannot be moulded, so **hardness of the head** sometimes delays labour.

The disease called **hydrocephalus** ("water on the brain") causes great enlargement of the child's head. The bones are soft and wide apart, the head dents easily, and feels like a bag made of stiff paper. A head of this

sort will not enter the pelvis, and thus causes delay both in the first and second stages of labour.

In rare cases the child's **body** is altered in size and shape by disease, tumours, and malformations which cause delay in labour.

Mal-position in Vertex Presentations has been mentioned above (see page 90). In occipito-posterior cases labour is slow for two reasons. When the occiput lies to the back of the pelvis, the long rotation forward to bring it under the pubic arch occupies a longer time than the short rotation in ordinary cases. Again, if the long rotation does not occur, but the occiput passes into the hollow of the sacrum, the case becomes a persistent occipito-posterior case. Labour with the head in this position is always prolonged, there is generally a bad tear of the perineum, and delivery by means of forceps is almost always necessary. This position is therefore called mal-position.

Mal-presentation of the head is quite a different thing from mal-position in vertex presentations. There are two chief forms of mal-presentation.

Brow Presentation.—It will be remembered that the vertex is the part of the head felt through the cervix in ordinary cases. But sometimes it is not the vertex but the brow of the child which is felt on vaginal examination. The head in these cases is not flexed, but is extended. In front of the presenting part the child's nose and eyes can be felt; behind it the anterior fontanelle may be recognised. In brow presentation a long diameter of the head lies across the pelvis and delivery is prevented.

Face Presentation.—If the head is still more extended, it is the face which presents and is felt through the cervix during vaginal examination. The mouth, nose, and eyes are recognised by touch. In this completely extended attitude of the head, delivery is difficult and prolonged.

The face may be in any one of four "positions," just like the vertex. If the chin comes to the front, labour may end naturally after delay; but if it goes to the back and remains there, a difficult operative delivery will result.

In brow and face cases help should be sent for as early as possible.

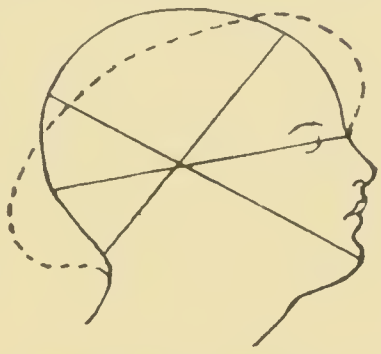

Fig. 59.—Head moulding in face cases. The caput succedaneum forms over the face, and the head is flattened, so that the occipito-mental diameter is lessened.

Complicated Presentations.—Sometimes one arm comes down beside the head, or one arm may lie across the neck behind the head. Help is required in these cases.

Short Cord.—Occasionally birth is delayed by unusual shortness of the cord.

Summary of Causes of Delay and Obstruction in the Second Stage

I. Faults in Powers.	1. Weakness of the accessory powers. 2. Primary or secondary uterine inertia.
II. Faults in Passages.	1. Narrow vagina and rigid perineum. 2. Distended rectum and bladder. 3. Ovarian and uterine tumours. 4. Abnormal pelvis. 5. Pendulous belly.
III. Faults in Passenger.	1. Large size of head. 2. Unduly ossified skull.

3. Enlargement of head or body by disease (hydrocephalus).
4. Mal-position of head (persistent occipito-posterior).
5. Mal-presentation of head (face and brow presentations).
6. Complicated presentations.
7. Short cord.

Delay and Obstruction in Breech (Pelvic) Cases

The breech does not fit the pelvis so well as the head, and there is consequently more pressure on the membranes by the waters. The bag of waters is therefore often long and irregular in shape and tends to break early. Breech cases are often delayed by this early escape of the waters.

Impaction of the Breech—The pelvis of the child may be large in size compared with the pelvis of the mother, and may become stuck or impacted.

Extension of the Legs—Sometimes the child's legs, instead of being bent at the knee, are straight (extended), so that its feet are up near its head. In these cases the whole child forms a wedge, with the breech at the narrow end. As the breech descends, the extended legs and the back of the child become jammed in the pelvis and the progress of labour is arrested. Both of these conditions cause varieties of obstructed labour.

Upward Displacement of the Arms.—When the legs and body are delivered, the arms may slip up beside the head and one of them may lie across the back of the neck. This is generally caused by pulling on the legs instead of helping delivery by pressing on the fundus. When the arms are displaced upwards during the delivery

of a breech case, the midwife must correct the displacement. She must send for help, but the child will probably be dead long before the medical man can arrive unless she can complete delivery quickly. She should pass the hand up the vagina until she feels the elbow of that arm which is most easily reached. Two fingers should then be pressed against the child's arm from shoulder to elbow, and the arm should be gently moved towards the child's face and brought down in front of it. While this is done the child's body should be held away in the direction opposite to the arm which is being brought down. When one arm is down, the body must be swung over in the other direction while the second arm is disengaged like the first. The bones near the shoulder-joint may be injured if this is not done with skill and care.

Delivery must be completed as described (on page 140) for normal breech cases, taking care to avoid *extension of the head,* which, by presenting a long diameter of the head to the pelvis, effectually prevents delivery until it is corrected.

Mal-rotation of the head means, in breech cases, that the child's face comes to the front instead of going to the back. If this is allowed to occur, the chin becomes hitched above the pubic symphysis, so that the longest diameter of the head is opposed to the conjugate of the pelvis. Delivery is impossible in this position and the child generally has to be destroyed.

Impaction of the After-coming Head.—Large size of the head as compared with the pelvis may prevent the successful delivery of the head in breech cases, quite apart from extension or mal-rotation. There is of course no time for head moulding in breech cases, for when the body is born the head must soon follow or the child will die. Again, the uterus being nearly empty, it works at a disadvantage on the after-coming head. As before mentioned,

the child's life will be lost before help can arrive, so the midwife should do her best to deliver herself by the methods mentioned on page 140. If these fail, the head will have to be delivered with forceps, or it may have to be perforated to reduce its size.

Difficulty in delivery of the after-coming head does not have the results on the mother which are seen in "obstructed labour," because the uterus is nearly empty after the body of the child has been born, and uterine contraction does not play much part in the end of the labour. The chief risk in these cases is thus to the child rather than to the mother.

Summary of Causes of Delay and Obstruction in Breech Cases

I. Faults in Powers.	These are the same as in head presentations.
II. Faults in Passages.	
III. Faults in Passenger.	1. Dry labour and bad dilating action of the breech.
	2. Impaction of breech.
	3. Extension of the legs.
	4. Upward displacement of arms.
	5. Extension of head.
	6. Mal-rotation of head.
	7. Impaction of head.

Cases of Transverse Lie (Cross Birth)

Very little need be said about transverse cases, for in them the midwife's duty is so simple. There is no difficulty in finding out by abdominal examination that the child's body is lying across the body of the mother, or in other words, that the "lie of the child is transverse." As soon as this is discovered, the help of a medical man must be

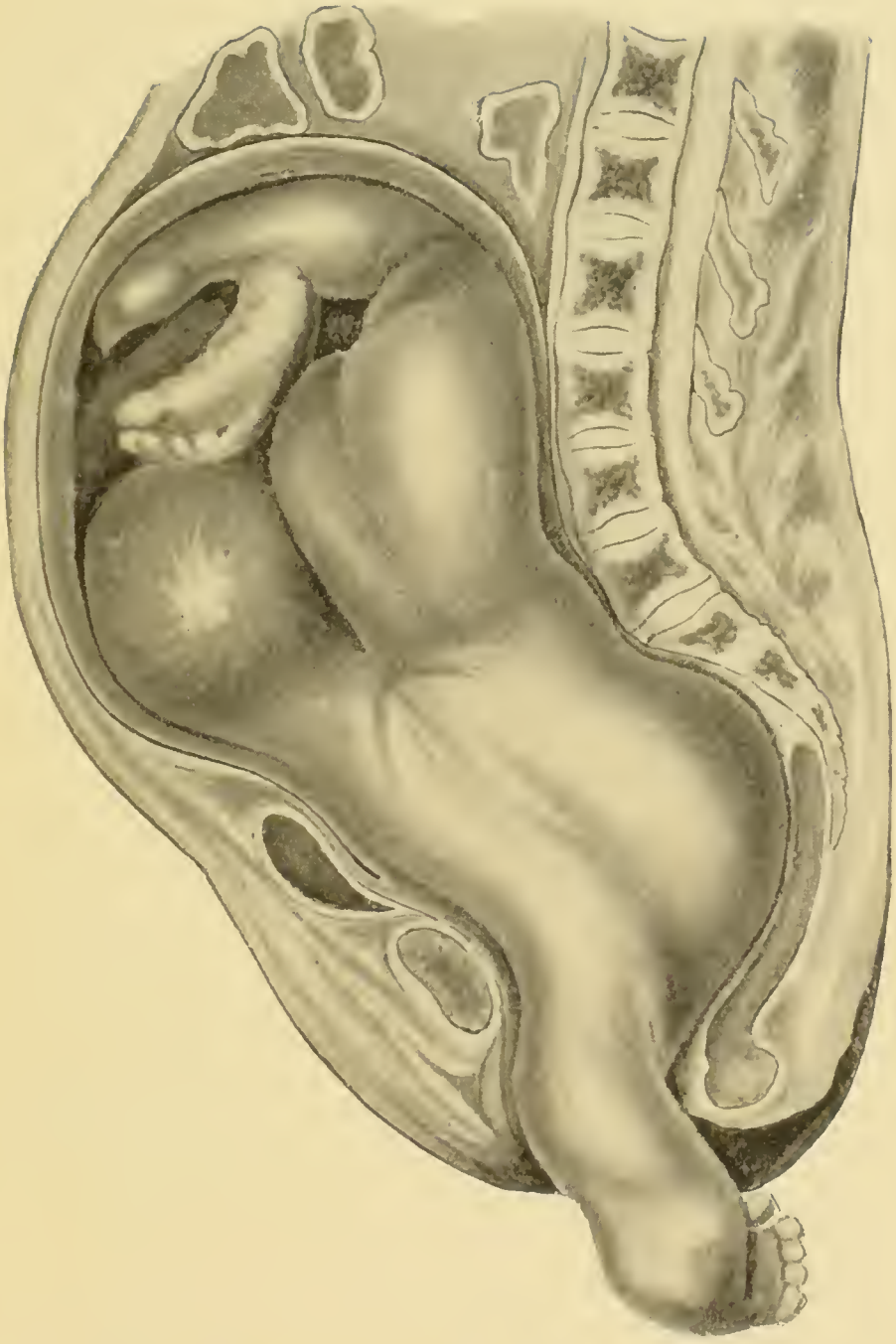

Fig. 60.—From Chiara's section of a woman who died during labour with the child in a transverse lie. The child's limp body is seen to be doubled up and in process of expulsion.

secured. In these cases the part which presents at the mouth of the womb is the arm or shoulder of the child. As this does not fit the pelvic brim like the head, the bag of waters is usually long and irregular in shape. It is thus likely to break early and allow the waters to escape.

To make the delivery of a living child possible, the "lie" has to be altered by bringing the child's body into line with the mother's body, so that either the head or the breech will present and enter the pelvis. This is generally done by bringing down the feet, and the operation is called "turning the child" or "version." Now, turning can only be done easily before or just after the rupture of the membranes. So the midwife has a second special duty in transverse cases, namely to take every care to **preserve the membranes** until the arrival of the medical man. With this in view she should avoid vaginal examination. She should put the patient to bed and keep her lying still. She should not give an enema, and she should prevent the patient from bearing down and making efforts of any kind.

In transverse cases which are not treated in time the child dies, after which its body becomes limp and may be doubled up and expelled. The mother's uterus may tear or rupture long before this occurs. These cases are amongst the most serious forms of obstructed labour. Very rarely the hands and the feet present together in transverse cases.

The Difference between Lingering Labour and Obstructed Labour

Let it be most clearly understood that there are two kinds of delayed labour. The merely slow or lingering labour is delayed because the **pains are not strong**. The

uterus is not doing much work, and the patient is not exerting herself in efforts to expel the child. She accordingly does not become worn out and tired, though she may complain a good deal.

When the pains are strong and frequent, but labour is delayed by a **mechanical obstruction** to delivery, the patient does become worn out and exhausted, and other bad effects may occur. When the uterus contracts, strongly and often, against a strong obstacle, the pains get longer and longer and the intervals between them become shorter and shorter. Gradually a time comes when the uterine contraction is continuous (or tonic). The abdomen then feels hard and tense, and pressure on it causes pain. The upper part of the uterus gets thicker and thicker, the lower part thinner and thinner, so that the retraction ring can be plainly felt through the abdominal wall. The patient's pulse gets quicker and quicker, and her temperature rises. Her mouth and lips become dry and her tongue furred. The vagina becomes dry and hot. The child's head is being compressed all the time, and when the contractions are continuous the placenta is squeezed between the uterine wall and the child's body. The circulation in the placenta may thus be so interfered with as to kill the child. The mother's uterus may rupture, a most fatal accident. The exhaustion makes bleeding more likely to occur after she is at last delivered. Fatigue and blood loss both favour the chances of septic infection during the puerperium. Obstructed labour is thus full of danger to the lives of both mother and child.

While a midwife is not expected to recognise the exact causes of delay in labour, she must know when labour is merely lingering and when it is obstructed, because while there is no immediate danger to the patient in slow labour, there is every reason for securing the help of a medical man at an early stage in obstructed labour.

	Lingering Labour	Obstructed Labour
Cause . . .	Weak powers, inertia.	Mechanical obstruction.
Pains . . .	Few and weak.	Frequent and strong, tending to become continuous.
Pulse . . .	Normal.	Quicker and quicker.
Temperature .	Normal.	Rises gradually.
Mouth . . .	Moist.	Dry and furred.
Vagina . .	Moist.	Hot and dry.
General condition.	Good.	Bad and becoming worse.
Mother . .	In no danger.	In great danger.
Child . . .	In no danger (heart beats normal).	In great danger (heart beats very fast, very slow, or not heard).

It is hardly necessary to point out that obstructed labour is seen in breech and transverse cases as well as in head cases.

ABNORMAL LABOUR

HÆMORRHAGE

I. Bleeding before the Birth of the Child (Ante-Partum Hæmorrhage)

Under this heading we include, for convenience, not only bleeding during labour, but bleeding which begins during the later months of pregnancy without the actual onset of labour. Hæmorrhage beginning late in pregnancy and early in labour is of two kinds. These are called "**Accidental Hæmorrhage**," and "**Unavoidable Hæmorrhage**" (Placenta Prævia).

Accidental Hæmorrhage, or Bleeding due to Separation of the Normally Situated Placenta.—The placenta is normally attached to that upper part of the uterus which contracts and retracts during labour. Sometimes the placenta becomes more or less separated towards the end of pregnancy, with the result that blood flows into the space between the placenta and the uterine wall. This bleeding from the normally placed placenta is called "accidental," because it is of the nature of an accident, and not because it is caused by an accident to the patient. Many patients have falls and injuries without any separation of the placenta as a result.

Sometimes the blood which escapes flows into the uterus, separating the placenta and a large portion of membranes, but does not escape through the cervix and vagina so as to be seen flowing out at the vulva. In other cases the blood does pass through the cervix, when it quickly escapes into the patient's clothes or into her bed, where it is seen. There are thus two varieties of accidental hæmorrhage:

the *concealed*, in which the blood remains within the uterus ; and the *apparent*, in which the blood escapes externally.

If **apparent hæmorrhage** begins before labour, it is recognised at once by the patient or her friends, who send to say that she is bleeding. If bleeding begins during labour, the public do not attach much importance to it ; but a midwife or nurse knows very well that in normal labour

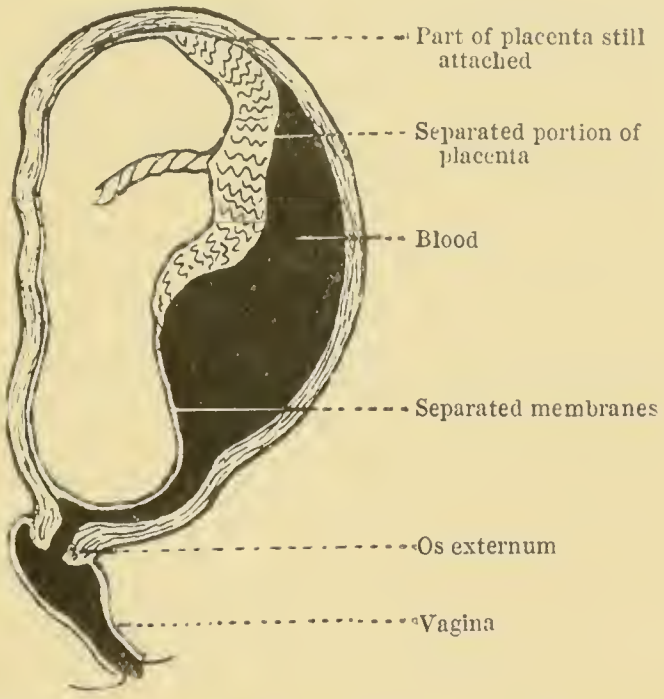

Fig. 61.—Diagram of accidental hæmorrhage or bleeding caused by separation of a normally-situated placenta. The apparent form of accidental hæmorrhage is the one figured, as blood is shown escaping through the cervix and vagina.

there is no bleeding before the birth of the child, except the slight show which occurs when dilatation of the cervix begins.

It is important to remember that a medical man must be sent for whenever there is bleeding before the birth of the child, whether labour has begun or not.

Concealed accidental hæmorrhage is a more serious affair, because there is no external flow of blood to call attention to the condition. The patient feels weak and looks pale, and she may become restless, anxious, breathless and faint. Even when there are no "labour pains," there

may be pain in the abdomen; but there may be none. In these cases it is necessary to recognise that the patient is bleeding without seeing any blood. The pulse is the best guide, as it becomes quicker and quicker steadily, and may rise from 80 beats a minute to 100; then to 130, then to 150, and more in a short time. The insides of the eyelids and the gums become pale, as the blood flows out of the patient's veins and collects in her uterus. The breathing gets quicker and quicker, like the pulse. The temperature does not rise. Death may be very quick in the worst cases of this sort, and no time must be lost before securing help.[1]

Bad cases of accidental hæmorrhage depend upon a diseased condition of the uterine wall, and are amongst the most serious complications of labour. Fortunately they are very rare. In slighter cases the mother is not so seriously endangered. The child's life is often sacrificed, as separation of any considerable portion of the placenta prevents the oxidation of the child's blood and kills it by suffocation. The child's blood does not flow from the placenta.

Unavoidable Hæmorrhage or Placenta Prævia.—It must be remembered that the lower part of the body of the uterus is dilated together with the cervix during the first stage of labour. This part reaches 3 or 4 inches upwards from the internal os; it is often called the lower-uterine-segment; it is passive during labour, while the upper part of the uterus is active. It is the part below the retraction ring which relaxes and becomes thin, while the part above retracts and becomes thick. During dilatation the membranes are unavoidably separated from

[1] It will be noted that the signs of concealed accidental hæmorrhage are the same as those of rupture of an extra-uterine pregnancy with bleeding into the abdominal cavity. The signs of internal bleeding are naturally alike, whatever its cause. In early pregnancy internal bleeding is commonly due to ruptured tubal pregnancy; in late pregnancy it is commonly due to separation of the placenta.

this lower part of the uterus, and this causes the "show" of blood at the beginning of labour.

Now, sometimes the placenta is so placed that some part of it is attached within the lower-uterine-segment. When dilatation begins, *any part of the placenta attached within the lower-uterine-segment must be separated*; this separation is "unavoidable," it is a part of labour when the

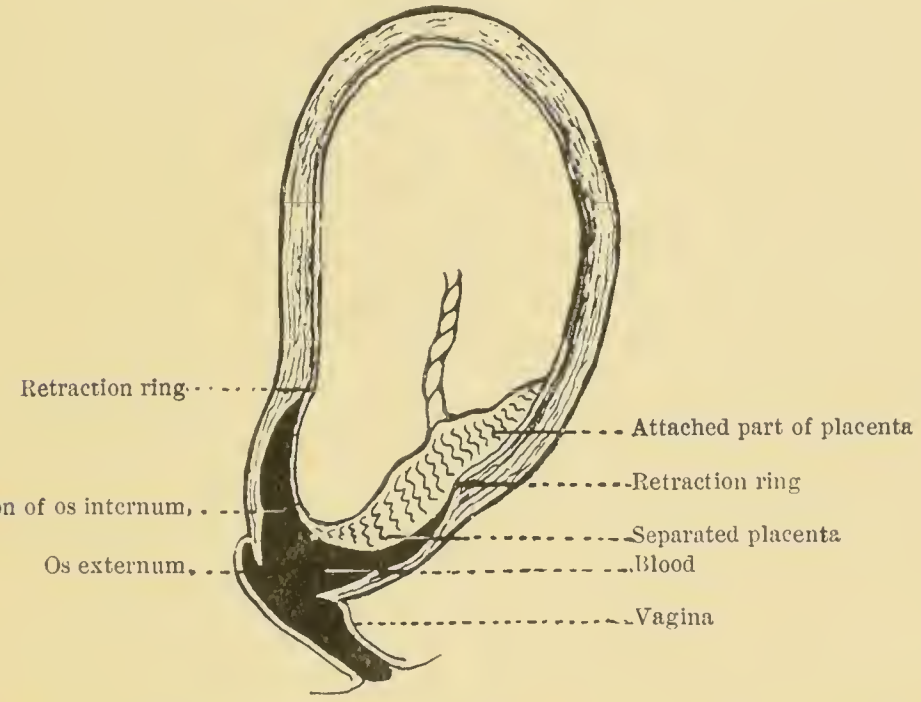

Fig. 62.—Diagram of unavoidable hæmorrhage or bleeding caused by the separation of a Placenta prævia. The membranes and placenta within the lower-uterine-segment are unavoidably separated during dilatation.

placenta is too low down. Blood flows from the uterine wall where the placenta is separated, and the bleeding thus caused is called "unavoidable hæmorrhage." It is not "accidental" like separation of the placenta attached in the ordinary way in the upper or retracting portion of the uterus. A placenta attached within the lower-uterine-segment is called a *placenta prævia*. Thus another way of describing this kind of bleeding is to call it hæmorrhage due to the separation of a placenta prævia.

The bleeding in cases of placenta prævia may be slight

or it may be serious. In placenta prævia the uterus tends to rupture easily. The child's life is endangered, because if much of the placenta is separated, the child's blood is not oxidised in the placenta and death occurs by suffocation, just as in accidental hæmorrhage. The child loses no blood from the separated placenta; the mother's blood alone escapes.

No midwife or nurse is expected to say whether a case is one of unavoidable or of accidental hæmorrhage.[1] All she need do is to recognise that bleeding before the child is born is an urgent reason for securing the help of a medical man.

Duties while waiting for help in accidental and unavoidable hæmorrhage.—The patient must be kept absolutely quiet in bed. The foot of the bed should be raised in order that the patient's heart and brain may have a good supply of blood. This should be done by putting a chair, stool or box under each of the two legs at the foot of the bed. A firm binder should be applied tightly so as to compress the uterus. A plentiful supply of fresh air should be supplied and the room should be kept cool. The midwife should not rupture the membranes, nor should she plug the vagina: these methods of treatment are no part of her business. Midwives do not plug either the vagina or the uterus under any circumstances; indeed they do not carry the instruments for the purpose.

II. Bleeding during the Third Stage of Labour

Smart bleeding sometimes occurs after the birth of the child before the birth of the placenta and membranes. This usually happens when the placenta is partly separated,

[1] If the placenta can be felt through the cervix the case is one of placenta praevia. But it must be remembered that a placenta attached within the lower uterine segment may be accidentally separated apart from the onset of labour; so there is really no way of absolutely distinguishing the two kinds of bleeding.

while the other part remains attached and hinders the uterus from retracting sufficiently to prevent the escape of blood. It is clear that the proper treatment for bleeding of this kind is to complete the separation of the placenta. This can generally be done by rubbing and squeezing the uterus, but occasionally these measures fail.

It is generally taught that no midwife should ever put her hand inside the uterus. But in some cases of bleeding due to partial separation of the placenta, the patient would bleed to death long before a medical man could arrive. The writer, therefore, considers that in severe bleeding during the third stage, the midwife should insert her sterilised hand and complete the separation of the placenta herself. The bleeding almost always stops as soon as this has been done. Rarely the uterus may fail to contract after it has been emptied, and the bleeding goes on. The case then becomes one of post-partum hæmorrhage, and must be treated accordingly.

III. Post-Partum Hæmorrhage

Bleeding after labour is over, that is after the placenta and membranes have been born, should not occur in cases which have been properly managed throughout. In other words, post-partum hæmorrhage can be and should be prevented. There are doubtless a few cases of women who have had a number of children one after another in which bleeding occurs in spite of every care. Women who are intemperate in their habits, and those who suffer from certain diseases, may also bleed, although properly treated; but in by far the greater number of cases, hæmorrhage after labour is the result of bad management.

To understand the cause of post-partum hæmorrhage, it is necessary to remember how it is that, in ordinary cases, bleeding from the uterine wall is not excessive after the placenta is separated. As soon as the uterus is

empty it contracts and retracts firmly, so that the blood vessels in its walls are squeezed by the muscles on all sides of them. This compression of the blood vessels by contraction and retraction of the uterus prevents the loss of more than 10 or 12 ounces of blood in most cases.[1]

The cause of post-partum hæmorrhage is failure of the uterus to contract and retract after the birth of the placenta.

Anything which hinders or prevents the uterine muscle from acting well at the end of labour thus tends to bring about bleeding. The one important thing which does this is fatigue, exhaustion of the uterus by its work during the labour.[2]

Therefore the way to prevent post-partum hæmorrhage is, first, *to take care that the uterus does not become unduly fatigued* during the first and second stages of labour; and second, *to avoid emptying the uterus when it is in a tired condition and is not contracting well.*

There is no difficulty in recognising post-partum hæmorrhage. The blood is seen to flow from the vagina in a stream or else in gushes; the uterus may be so large, soft and relaxed that it is difficult to feel it through the abdominal wall. In some cases the flow of blood from the vagina is not sufficient to attract attention until other symp-

[1] Later the blood becomes clotted in the torn ends of the blood vessels. The whole uterus slips down into the pelvis which it fits pretty tightly, and the back and front walls of its cavity lie pressing against one another. Thus when the uterine muscle relaxes a few hours after labour, there is no fresh bleeding.

[2] Apart from simple fatigue, some other conditions which tend to prevent proper uterine contraction and retraction must be mentioned. Such are certain states of the blood; weakness of the uterine muscle due to frequent previous pregnancies at short intervals; disease of the uterine wall; tumours of the uterus and other organs; large size of the placenta as in twin pregnancy; portions of placenta or membranes left in the uterus; deformity of the pelvis; hæmorrhage during labour. In the presence of most of these conditions, something occurs during labour which demands the presence of a medical man, so that in cases where bleeding is likely to occur after labour the midwife is seldom alone at the end.

toms of bleeding are noticed. These are paleness, quick pulse and quick breathing. Examination of the abdomen then shows that blood has been flowing into the uterus and remaining there, only to escape when the uterus is squeezed. This sometimes occurs while a nurse is sitting by the patient with her hand just above the pubes, holding what she wrongly imagines to be the fundus, while the uterus, full of blood clots, is up in the abdomen far above her hand.

In serious post-partum hæmorrhage, as in serious loss of blood from other causes, the patient becomes restless and anxious. She gasps for breath and is bathed in cold sweat. She may complain of failing sight before she loses consciousness.

If blood flows from the vagina and at the same time the uterus can be felt firmly contracted, it is certain that the blood is not coming from the body of the uterus where the placenta was separated, but from a tear in the cervix, the vagina, or the perineum. This is not true post-partum hæmorrhage, though of course it is bleeding after the end of labour. Bleeding from tears generally stops pretty quickly, but when it has occurred, help should be sent for in order to have the tear repaired by stitching.

Prevention.—The prevention of post-partum hæmorrhage should be kept in mind from the beginning to the end of every case of labour. In other words, care should be taken throughout to prevent the uterus from becoming worn out, lest it should be unable to contract properly when labour is over.

More than all others, cases of "obstructed" labour are those which wear out the uterus. If the contractions are strong and regular, but there is some obstruction which they cannot overcome, the patient's strength fails; and if the uterus does not rupture, its contractions die away at last from exhaustion of the uterine muscle. If the patient is

delivered by forceps in this condition, before time has been allowed for the uterus to recover its strength, bleeding is sure to follow delivery. Thus in all cases of delay, especially in delay due to obstruction, help should be secured early, before fatigue has begun.

Bad management of the third stage is perhaps the commonest cause of bleeding. For in all cases, after the uterus has made its great effort and expelled the child, it rests for a shorter or longer time before it begins making those contractions which separate and expel the placenta. Now if the attendant is impatient and squeezes out the placenta without allowing the uterus plenty of time to rest, the uterus is emptied before it is ready to contract. Further, squeezing out the placenta before it is separated tends to tear it and to leave bits of it in the uterus, which, in turn, prevent proper retraction and so cause bleeding. Therefore the placenta should be allowed to become separated and to be expelled from the uterus into the vagina before any attempt is made to deliver it, unless, as above mentioned, there is severe bleeding caused by partial separation.

During the third stage, a hand should be kept on the fundus, rubbing it gently from time to time if contraction is not satisfactory. This control of the uterus should be kept up after the placenta is delivered until the uterus is firmly retracted, and bleeding is reduced to a slow oozing. Ergot may be given if retraction is not satisfactory, but it does not act quickly enough to be of much use in actual post-partum hæmorrhage.

Treatment by external manipulation.—In cases in which the bleeding is too profuse the uterus should be grasped firmly with both hands through the abdominal wall, the patient lying on her back. The hands must squeeze, rub and compress the uterus so as to force the blood and clots out of it, and must then keep it compressed

and pushed well down into the pelvis. It is very seldom that anything further is required, beyond a dose of ergot and careful watching until the uterus retracts firmly.

Treatment by bi-manual compression of the uterus, and treatment by the hot intra-uterine douche.—There are two other methods of treatment which are often taught to midwives for use when free bleeding continues in spite of manipulation of the uterus through the abdominal wall. One of these is **bi-manual compression of the uterus.** In this the left hand keeps hold of the fundus through the abdominal wall, while the right hand, after being held for a few moments in a bowl of mercurial lotion, is passed into the vagina, and on into the uterus, which it quickly empties of blood clots and of any fragments of placenta or membranes which it may contain. The hand is then withdrawn from the uterus into the vagina, and the fingers being behind the cervix, the uterus is squeezed hard and continuously between the two hands, one on the abdomen, the other in the vagina, the cervix in its palm. The uterus must be held tight in this way for as long as may be necessary.

This method has the danger that the patient may easily be infected if the hand in the vagina is not sterile. It is sometimes very difficult to secure control of the relaxed uterus, and the hands must be very strong if pressure is to be kept up effectively.

The other method of treatment taught is the **injection of hot water** into the cavity of the uterus. The water must be at a temperature of 120° F. and this should be secured by using a thermometer. The midwife must not leave the uterus in order to prepare the douche. So unless there is some one else in the room who is skilled and experienced in aseptic methods, this treatment is out of the question.

It must be stated that some authorities consider bi-

manual compression safer, better, and more suitable for use by midwives than the hot intra-uterine douche. Others are of exactly the opposite opinion, and prefer the douche to bi-manual compression. These methods both have special disadvantages for midwives. An absolutely sterile hand is required for either; sterile water at a proper temperature and sterile douche apparatus are also required for the latter. In the ordinary course of her daily work, the midwife is alone with her patient, except for the presence of one or more friendly neighbours. She can hardly avoid touching various septic articles just at the end of labour, and cannot possibly employ either bi-manual compression or the hot douche without risk of infecting her patient. It is doubtless better to take this risk than to let the patient bleed to death. But another course is open.

Treatment by compression of the aorta and raising the foot of the bed.—The blood flows from the heart to the lower part of the body, through the *abdominal aorta.* This great blood-vessel runs downwards in front of the spine, and after labour its pulsations can be felt more easily than usual through the abdominal wall, by pressing the hand in deeply at the level of a little above the umbilicus.

If the outer side of the hand is placed across the course of the abdominal aorta, and is then pressed firmly against the back bone, the aorta is squeezed or compressed between the hand and the spine. When feeling the pulse at the wrist, the finger can stop the pulse altogether by extra pressure. In just the same way the pressure of the hand can be made sufficient to stop the flow of blood from the heart through the aorta to the lower part of the body. The pulsations of the aorta cease to be felt when extra pressure is applied. As the pressure is taken off, the heart beats are felt again. These facts are easily observed

after the delivery of the placenta in any case of labour, unless the patient is extremely fat.

The blood supply of the uterus can thus be stopped, for the most part, by compressing the abdominal aorta so as to stop pulsation, just as the water supply of any part of a house can be stopped by turning off the tap at the water main.

It was found nearly a hundred years ago that post-partum hæmorrhage could be stopped by compressing the aorta and keeping it compressed until the uterine muscle could recover from its worn out condition and do its own work.

It has been said that if the bleeding is stopped by compression of the aorta, the uterus will be so completely deprived of blood, that it will never recover from its worn out condition, but will become more and more flabby. But compression of the aorta does not entirely cut off the blood supply of the uterus. For the ovarian arteries leave the aorta above the point where it is compressed, and they convey enough blood to the uterus to enable it to recover its activity, although its main supply through the uterine arteries is cut off by compression of the aorta. Actual trial proves that the uterus does recover and contract after a time during which the aorta has been kept compressed.

Besides the blood which flows from the arteries in the uterus, a certain quantity of blood also escapes from the veins instead of running back to the heart. Those who are accustomed to pelvic operations are well aware that if the lower part of the body be raised so that the pelvis is considerably higher than the chest, the escape of blood from open veins in the pelvis is very greatly reduced. Therefore, in post-partum hæmorrhage, the bleeding from the veins can be stopped to a great extent by raising the foot of the bed high above the head, and keeping it up by means of chairs placed under the bed legs, or a table

placed under the cross bar at the bed foot. This course has the additional advantage of securing a good supply of blood to the head and to the heart, which is most desirable in all cases of hæmorrhage.

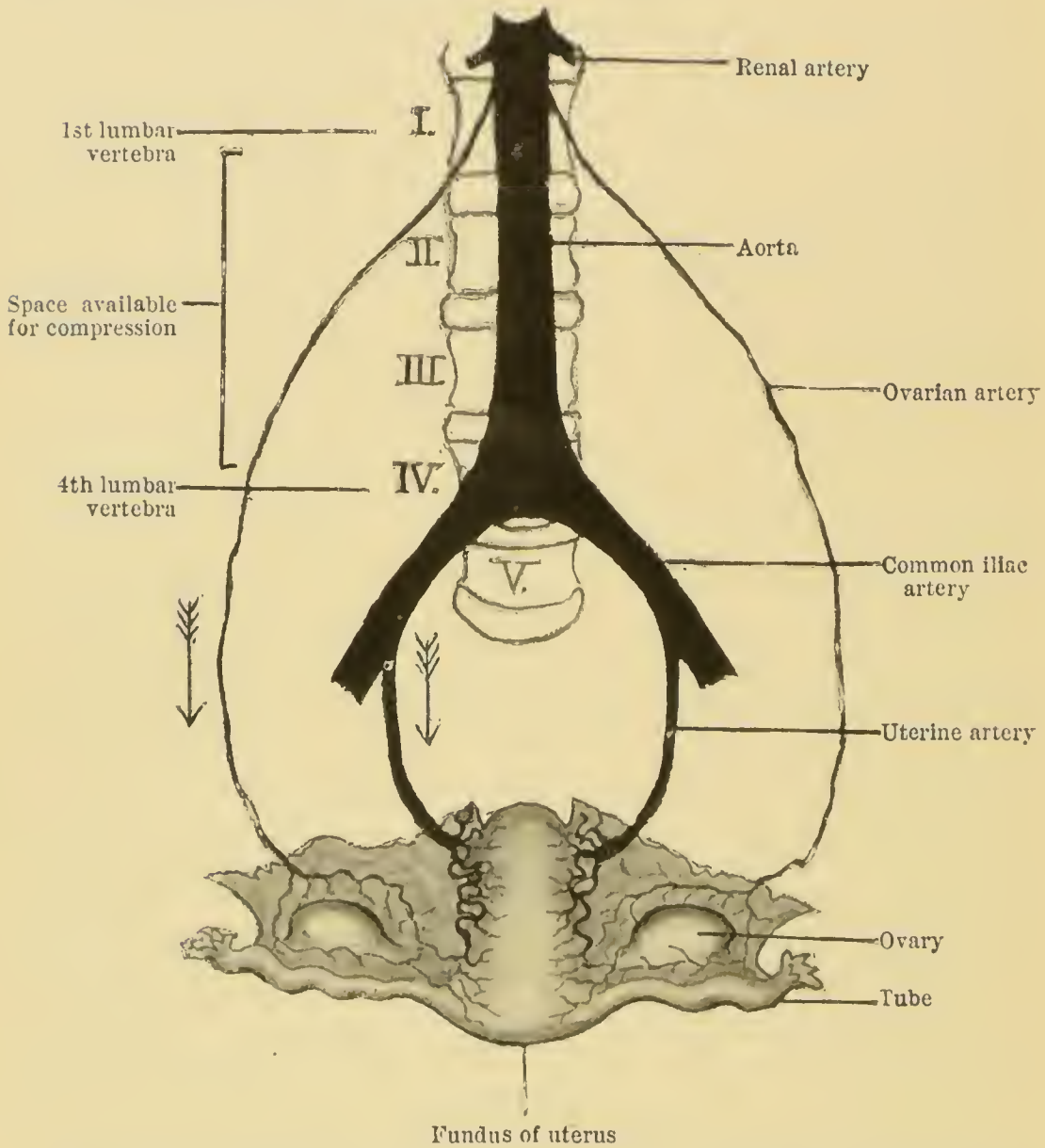

Fig. 63.—Arterial blood supply of uterus. Diagram drawn (with uterus well turned forward) to show where the aorta should be compressed, and to show that the blood supply through the ovarian arteries is not stopped during compression of the aorta. The navel is at the level of the 4th lumbar vertebra, so the most favourable place for compression is an inch or two above the navel.

The method advised is thus briefly as follows :—

After the delivery of the placenta and membranes, if there is bleeding which does not cease when the uterus

has been rubbed and compressed with both hands through the abdominal wall the case must be regarded as one of post-partum hæmorrhage.

The midwife should then press the outer side of the closed left hand firmly into the abdomen a little above the umbilicus until she feels the pulsations of the aorta. The pressure must then be increased until pulsation is stopped, and must be kept up continuously. The other hand should be kept on the fundus and should encourage contraction by rubbing and squeezing.

As soon as the midwife begins compression of the aorta the foot of the bed should be raised high in the air, so that the patient's pelvis is more than a foot above her head. Two people should do this, one raising the bed while the other places chairs or table to support it. The midwife of course cannot leave the patient for a moment. As soon as this has been done, a messenger must be sent for a medical man.

The pressure on the aorta should be kept up until the uterus is felt to be firmly contracted. If the left hand becomes too tired to maintain the pressure, the hands may be changed, taking care to place the right hand on the aorta close to the left, before removing the left hand.

When the uterus is firmly contracted the pressure on the aorta may be gradually withdrawn.

This method of treating post-partum hæmorrhage has great advantages for midwives.

First. It is certain. No woman can die of bleeding from the uterus which occurs while the abdominal aorta is compressed sufficiently to destroy pulsation; the pelvis being at the same time raised a foot or more above the level of the head.

Second. It is quickly applied; as the compression of the aorta is begun in one or two seconds, and the raising of the bed foot should require very little longer.

Third. No instrument or apparatus is required.

Fourth. As nothing is passed into the vagina or uterus, there is no risk whatever of infecting the patient.

Fifth. It is easier than bi-manual compression and intra-uterine douching, and the skill necessary can be easily acquired by feeling for the aorta after labour in ordinary cases.

Treatment after Hæmorrhage

Midwives and nurses should know how to treat a patient who has lost a large amount of blood. The head should be kept low by removing all pillows and bolsters, and a good supply of blood to the brain and heart should also be favoured by keeping the foot of the bed raised. The blood may be driven from the limbs into the body by bandaging the legs from the feet upwards and the arms from the hands upwards. Each limb should be raised to let the blood flow out of it before the bandaging is begun.

Fluid should be supplied to the body in the form of warm water with a teaspoonful of common salt dissolved in each pint. This should be injected into the rectum a few ounces at a time, when it will be retained and quickly absorbed. Fluid may be given by the mouth as soon as the patient can swallow it.

Classification of Kinds of Hæmorrhage

I. Late in Pregnancy and Early in Labour (Ante-partum).

1. Accidental hæmorrhage { Apparent. / Concealed.
2. Unavoidable hæmorrhage (Placentā prævia).

II. During the Third Stage of Labour.

III. After Labour (Post-partum).

Note that bleeding from tears in the cervix, vagina and perineum may occur during the third stage and also after labour.

ABNORMAL LABOUR

ACCIDENTS AND COMPLICATIONS

Rupture of the Uterus

It has been mentioned that this serious accident is one of the results of obstructed labour. Thus it occurs in transverse cases, in contracted pelvis and in conditions such as hydrocephalic enlargement of the head. The lower uterine segment is gradually stretched and thinned, and it can often be felt to be distended by the part of the fœtus which is lying in it. The retraction ring found at the lower border of the upper or retracting part of the uterus meanwhile becomes thicker and more distinctly felt, and at the same time it rises higher and higher above the pubes. When this thickened ridge can be felt 2 inches above the pubes, the help of a medical man should always be secured, even if the patient's condition remains good. But in most instances help will have been obtained before this stage is reached. Sometimes the uterus tears or ruptures by itself or "spontaneously," but more often it tears during the performance of some necessary operation such as turning.

A diseased condition of the uterine wall, the presence of uterine tumours and placenta praevia are circumstances which favour rupture. The tear may be through the cervix at one side, running up into the wall of the uterus, or it may be above the cervix. Tears also run across the top of the back of the vagina separating it from the cervix. Ruptures of these kinds may extend right through the peritoneal membrane which covers the uterus, so

extending into the abdominal cavity. Sometimes the fœtus and occasionally also the placenta may escape from the uterus through the tear into the abdominal cavity.

For the midwife, the important thing is to know that such accidents occur, and to recognise when they are threatened. She should send for help without waiting for the worst. The signs that rupture has actually occurred are the stoppage of the uterine contractions, pain in the abdomen and hæmorrhage. Blood may escape freely from the vagina, or it may flow into the abdominal cavity and so may be concealed.

Tears of the Cervix and Perineum

The common tears of the cervix are caused by the application of forceps, or by turning before dilatation is complete. In rapid labour a patient sometimes expels the child before the cervix is sufficiently dilated, and so causes tearing quite apart from artificial delivery. These tears do not cause much bleeding as a rule, but if blood flows freely from the vagina after labour the uterus being at the same time firmly contracted, it may be concluded that there is a tear in the cervix or vagina which requires the attention of a medical man.

In first cases there is always some tearing of the margin of the perineum. In subsequent labours there is seldom tearing unless from some special cause, such as delivery in the occipito-posterior position. Slight tears are of no importance. Those which extend into the thickness of the perineum should always be stitched for two reasons. First, they very easily become infected, suppurate, and may thus become the starting-point of puerperal fever. Second, if not stitched, they heal up in a way which leaves the floor of the pelvis permanently weakened. For the torn edges do not unite; but simply become gradually covered with skin, leaving the vaginal opening much larger

than it was before. Tears which go through the wall of the anus as well as through the perineum are called **complete tears**. If they are not repaired, the patient is left in a miserable condition, for she loses control over the motions of the bowels. Many women remain for years in this condition, unable to leave their homes for any length of time, afraid to appear in public lest they may be unable to retain a loose motion. Therefore complete tears must always be repaired as soon as possible after labour. If this is not done within a few hours, the torn parts often fail to unite, and the patient must then, after waiting for three months or more, undergo a second operation after the raw surface has become covered with skin.

The methods by which tears of the perineum can be avoided as far as possible have been mentioned above (see page 128).

Inversion of the Uterus

Very occasionally the uterus is turned inside out after labour. This occurrence, inversion as it is called, used to be more frequent when it was common for midwives to pull on the umbilical cord with the object of delivering the placenta. When inverted, the uterus is found in the vagina with its bleeding internal surface outward. There is no *os* to be found, as it is the fundus which occupies the lower part of the vagina. On abdominal examination the uterus cannot be found above the pubes. If the inversion is not corrected the result is generally fatal. The longer the uterus remains inside out, the more difficult is the operation of restoring it to its proper position.

Hæmatoma of the Vulva

Another very rare accident is the rupture of blood vessels in the vulva or vagina, followed by the formation

of a large purplish swelling, consisting of blood clots lying under the skin. Such a swelling is called a *hæmatoma.*

Rupture of Varicose Veins

This is an accident which sometimes causes serious bleeding during labour.

Eclampsia

It was mentioned when describing the diseases of pregnancy that convulsions of a certain kind called "puerperal convulsions," or "puerperal eclampsia," may occur either (1) **near the end of pregnancy**, (2) **during labour or** (3) **during the puerperium.**

Under certain circumstances which are not understood, a poison whose exact nature is not known, exists in the blood during pregnancy. Amongst the effects of this poison are convulsions and loss of consciousness. The poison also injures the kidneys in such a way that albumen passes from the blood through the kidneys and appears in the urine. Albumen is a substance which turns solid when heated. This accounts for the fact that the urine of eclamptic patients turns partly solid when tested by boiling, just as it does in some diseases of the kidney. It was indeed long considered that diseases of the kidneys was the cause of eclampsia, but it is now known that the poison above mentioned is the cause both of the kidney disease and of the eclampsia.

Sometimes warning is given by the occurrence of swelling of the limbs, headache, dimness of vision and vomiting. The urine, if examined, turns solid when boiled. Treatment under these circumstances may ward off the convulsive attacks. More often, perhaps, the patient has complained of nothing, when one day, often after a full meal, her eyes become fixed, and her body

and limbs rigid, the limbs jerk continuously for two or three minutes, the face becomes purple, and froth is blown from the mouth, which is often stained with blood, the tongue being nipped between the teeth. The patient is completely insensible and remains so for some time after the fit passes off. She may become more or less conscious after a time, but often remains insensible until another fit comes on, with loud harsh breathing. The fits are repeated at longer or shorter intervals, the patient being more exhausted after each is over. Sometimes there are twenty or more in a few hours, and still the patient may recover. More often she becomes exhausted and dies after a smaller number of seizures.

Occasionally the patient becomes deeply unconscious after a single fit, or perhaps without having a fit, and dies without showing any further sign of life beyond her noisy breathing and the beating of her enfeebled heart.

The treatment of this condition has been greatly improved during recent years, and in some hospitals, less than twenty in a hundred of the eclamptic patients now die. It is of the utmost importance that midwives and nurses should understand the nature of the warning symptoms (see page 179), such as headache, swelling and alterations in sight, as by securing early attention to these indications they may save the lives of patients. They must also know how to act when in the presence of convulsions, whilst waiting for the arrival of a medical man.

During the actual fit the patient should be allowed to lie where she falls, and should be prevented from hurting herself by her unconscious movements. Her clothes must be loosened, and a cork, a piece of indiarubber or some other suitable article should be placed between her teeth to prevent biting of the tongue. A free supply of fresh air must be provided.

As soon as the fit is over, the patient should be put

to bed. The bowel should be empted by large and repeated enemata, as this is a necessary part of the treatment. Everything possible should then be done to make her perspire freely. If it is possible to put her in a hot, wet pack this should be done. In any case she may be surrounded with bottles filled with hot water, taking the greatest care to avoid burning her skin. Many patients have been badly burned in this way during their unconsciousness.

Prolapse of the Umbilical Cord

Sometimes a loop of the cord can be felt through the membranes before they are ruptured. This is called **presentation** of the cord. By **prolapse** of the cord is meant the descent of a loop of it into the vagina after rupture of the membranes. Sometimes the cord is brought down by a rush of liquor amnii when the waters escape, which is one reason for making a vaginal examination just after this happens. If the head presents and the pelvis is normal in shape there is seldom room for the cord to pass the head. In mal-presentations, in breech and transverse cases, and when the pelvis is deformed, this accident is more likely to occur. In placenta prævia, and when the cord is inserted into the margin of the placenta instead of its centre, the cord lies nearer than usual to the os, and is accordingly more likely to be prolapsed.

If pulsation can be felt in the cord, the child is alive, and every effort must be made to prevent the cord from being compressed, which would be fatal to the child. The midwife should send for help at once, for it is often possible to complete delivery at once with forceps and so secure the child's life without any additional risk to the mother.

While waiting for help, the patient should be placed

in the knee-chest or genu-pectoral posture. Kneeling on the bed with the hips directly above the knees, she must rest her chest and head on the bed, the face being turned

Fig. 64.—Genu-pectoral or knee-chest position. Used in prolapse of the cord, in passing the catheter during the second stage of labour, and in raising a retroverted gravid uterus. It is most important that the hips should be directly over the knees, so that they may be as high above the bed as possible.

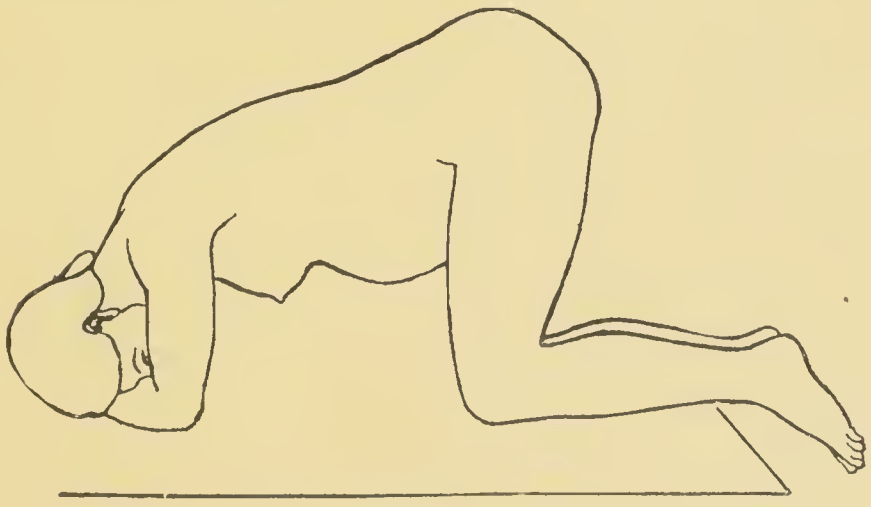

Fig. 65.—The knee-elbow position, which is more comfortable but less effective than the knee-chest position.

to one side for breathing. In this position the fundus is the lowest and the os is the highest part of the uterus. The child thus slips away from the pelvis by its own weight, and pressure on the cord is thus avoided. If pushed back into the uterus, the cord will often stay in

so long as this position is preserved, though it would quickly prolapse again if the patient were to lie down. The knee-chest position is not comfortable, and if the patient cannot keep in it, she may be allowed to relieve herself by changing to the knee elbow position, the elbows and forearms resting on the bed instead of the chest and head. It must be remembered that there is more room to either side of the promontory than there is in the middle of the pelvis, so the cord should be pushed to that side at which there is most room.

Twins

The birth of twins seldom causes much difficulty, because as a rule both are small, and are easily expelled one after the other. It should be remembered, however, that the uterus is often very much distended before labour, and that this hampers uterine contraction and tends to make the first stage slow. There are either two after-births or a single large one, and this large placental area sometimes causes difficulty in the separation of the placenta, and tends to increase the bleeding after labour. After the birth of the first child, the cord must be tied in two places lest the second child should bleed to death through some communication between the placental blood-vessels of the two children. The uterus takes a rest for a while and then begins to contract again. It is necessary to make sure that the second child is presenting in a manner favourable for delivery. If it is lying transversely it should be turned without delay, and for this reason, if for no other, help should be secured as soon as it is found that there is a second child in the uterus. Extra precautions should be taken against post-partum hæmorrhage, as the uterus may be worn out by the extra work of expelling the second child, and the placental surface is larger than usual.

Occasionally, when the breech of one child and the head of the other occupy the lower part of the uterus, the body of the one whose breech presents is born, and then the heads of the two children become locked together so as to prevent the birth of either of them. In these cases the life of the first child is almost sure to be lost, so attention should be directed towards saving the life of the second, that is of the one whose head presents.

Asphyxia and Apnœa of the Newly-born

The terms *asphyxia* and *apnœa* are applied in cases in which the child does not begin to breathe after it is born. Asphyxia, strictly speaking, means absence of pulse, and apnœa means absence of breathing. There are two varieties or stages of the condition, **asphyxia livida** and **asphyxia pallida.**

In an ordinary case, as soon as the child's head is born, its face begins to turn purple or bluish. Just at this time the child is partially suffocated, because the cord is compressed by the child's neck sufficiently to interfere with the placental circulation, and the child's lungs have not as yet begun to work. As soon, however, as the body and legs are born, the child begins to breathe, the blood is purified, and the face quickly becomes natural in colour. When breathing does not begin after the birth, the skin of the child remains **blue** or **livid** in colour, and for this reason the condition is called asphyxia livida. The child's heart is beating, but it does not cry or gasp, and does not take air into its lungs. The first thing to do is to make sure that the mouth, nose and throat are not blocked by blood and mucus. The mouth should be quickly cleared with a finger, or it may be necessary to use a small sponge, or a scrap of cotton wool. Many people hold the child up by the legs for a few moments, so that any fluid may run out at the mouth.

Next the cord must be tied and cut, and some method of driving air into the lungs must be used until the child begins to breathe for itself. This artificial respiration can be managed in several ways.

One way is to lay the child on its back, and get someone to hold its feet. Taking one of its arms in each hand, pull them firmly but gently above the head, keeping them well back. This movement expands the chest and draws air into the lungs if the throat is clear. Then lower the arms and press them firmly against the sides of the chest, so as to drive air out of the lungs again. These two movements should be repeated about twenty times in a minute. This is called Silvester's method; it has the advantage that it can be used while the child is lying in a hot bath covered with water all but its face. It also allows the child's tongue to be pulled well out by the person who is holding the feet with one hand, and this both keeps the mouth open and stimulates the child to breathe for itself. One of the best ways of starting breathing is to give repeated tugs at the tongue. This method, however, is not nearly so good as some other ways of forcing air in and out of the lungs, and it has the disadvantage that an assistant is required.

The method named after Schultze consists in supporting the head between the wrists, the two thumbs lying on the child's chest, while the fingers of both hands grasp its back. The child is lifted thus, and first the legs are allowed to hang down, while the fingers support the back. so that the chest is expanded and filled with air. Next, to drive out the air, the child's legs are swung over its head, the operator raising the child as if to throw it over her shoulder. This is a risky and dirty method. It spatters the room with blood and meconium, and unless held in a towel, the slippery child may fly out of the hands of an unskilled person. The child is sometimes

Fig. 66.—Showing the position of the child in inspiration during artificial respiration by Buist's method. The child has been turned sideways to show the position more clearly. In practice the child's feet are always towards, and its head away from the operator.

Fig. 67.—Showing the position of the child in expiration during artificial respiration by Buist's method.

injured by the use of this method, so that one or both arms are paralysed for months, or even permanently.

Much the best method is that of Dr R. C. Buist, of Dundee. The child is placed on its back on the left hand, the legs, arms and head hanging back. The chest is thus very fully expanded. Then the child is tossed gently into the right hand, turning over on the way so that it now lies with its chest on the right hand. The head, legs and arms now hang forward, and, the weight of the child now resting on its chest, air is forcibly driven out of the lungs. The fingers of the right hand give the ribs a squeeze to completely empty the lungs, and then the child is tossed gently back again to lie on its back on the palm of the left hand as before. This is repeated about twenty times in a minute. The method is clean, harmless and effective.

In most cases of **asphyxia livida** the child begins to gasp after a few minutes of artificial respiration, and no other treatment is required.

In the condition called **asphyxia pallida** the child is born **pale,** its skin being **white**, and not blue. Its body is limp instead of being fairly firm, and its heart beats are very feeble instead of being moderately strong. Asphyxia pallida is a much more serious state than asphyxia livida. While the midwife does artificial respiration by Buist's method, someone must prepare a bath at a temperature of 100° F. A good handful of mustard added to the bath water stimulates the child's skin usefully. As soon as the bath is ready, the child must be put in it, artificial respiration being continued by Silvester's method, the tongue being held forward and tugged from time to time.

At short intervals also, the child should be lifted out of the bath for more active treatment. The skin may be rubbed with whisky or methylated spirit, and a handful of cold water may be dashed on the chest, as this often

makes the child gasp and breathe for itself. A cold bath should not be used, as it takes much needed heat from the body of the child, and thus hastens its death. If there is no attempt at breathing, Buist's method may be continued for a few minutes, and then the child should be returned to the hot bath, which should be kept at 100° F. by the addition of boiling water. This process sometimes succeeds after as long as an hour and a half of continuous artificial respiration. Medical assistance should be secured as soon as it is seen that the child does not breathe properly. If there is never any attempt at breathing, or any other sign of life, the heart gradually stops, and the child dies. It is then said to be **still-born**, and its death is reported accordingly to the local supervising authority.

If the child gives only a single gasp, it is considered to have lived a separate life, and this must also be reported. If a medical man is present, he will supply a death certificate in the usual manner.

It is sometimes advised that the midwife should blow into the child's mouth, so as to inflate the lungs. This is often done, but as a rule most of the air passes into the child's stomach, which it distends, while very little enters the lungs.

Retained Placenta and Adherent Placenta

Sometimes the placenta does not leave the uterus and pass into the vagina for a long time. After waiting an hour for the signs that the placenta has become separated, and has passed into the vagina, an attempt should be made to expel it by compression of the fundus. If this fails, help should be secured. The retraction ring occasionally so narrows the outlet from the body of the uterus, that the placenta cannot escape. This is called "Hour glass contraction," and it generally occurs when ergot has

been given before the delivery of the placenta. It is seldom seen now, because the use of ergot is generally avoided until labour is over. The placenta is occasionally so firmly attached to the uterine wall, that it must be separated by hand. This condition is called "adherent placenta," and is a much more serious complication than a placenta which is simply "retained" in the uterus and not firmly attached. The removal of an adherent placenta is a difficult and dangerous operation. A partially adherent placenta may cause bleeding during the third stage (see page 208).

ABNORMAL PUERPERIUM

Puerperal Fever

As already stated, puerperal fever is a form of the disease which is known to the public by the name of **blood-poisoning**, and which is called *septicæmia* by medical men. The disease is the same whether the germs which cause it enter the body by an external wound, or by the raw surface inside the uterus produced by the separation of the placenta. The germs are not of one particular kind, but several of the commonest bacteria can produce the disease. The methods used for preventing these germs from reaching the vulva, the vagina and the uterus of the lying-in patient have already been described. These methods are the principal preventive measures against puerperal fever.

It has also been mentioned that patients who have been exhausted by prolonged labour, or who have lost a large quantity of blood, are much more likely than others to suffer from infection. The prevention of exhaustion and of blood loss are thus important parts of the prevention of puerperal fever.

It is necessary to understand that germs may get into the body of the patient by several different routes. The lying-in woman may have a torn perineum, she may have tears in the vagina, and the cervix may also be torn. The portion of the uterus to which the placenta was attached is left a raw and bleeding surface after labour, and the whole inside of the uterus is more or less rawed by the separation of the membranes. If a

few germs come into contact with any of these torn and raw surfaces, they may grow and multiply rapidly, living on the fluids of the patient's body. They then produce poisonous substances which are quickly absorbed into the patient's blood. Next the germs themselves pass into the blood, and move with it all over the body, so that a drop of blood taken from the patient's ear or finger is found to contain bacteria of the same kind as those growing in the uterus. Living in the blood, the bacteria still go on producing poisonous substances, so the popular term "blood poisoning" is a good name for the disease. It has been sufficiently explained that the supremely important duty of midwives and nurses is to prevent puerperal septicæmia. It is also necessary that they should be familiar with the earliest warnings and signs of infection, in order that help may be obtained, and treatment begun at the earliest possible moment in cases in which infection has occurred.

The first indication is generally an **increase in the rate of the pulse.** It has been mentioned that the pulse rate should be about 60 on the day after labour, and that it gradually rises to about 80 by the end of a week. During the first twenty-four hours, however, the patient is often disturbed by fatigue and excitement, so that too much attention should not be paid to variations during that time. On the contrary, if the pulse rate should rise above 100 per minute on the third or fourth day, there is cause for anxiety. It is not suggested that a high pulse earlier than the third day cannot be due to infection, for the infection may have been received before labour. Also infection may be received any time during the puerperium, causing a rise of pulse rate a day or two later. But if infection is received during the course of labour, symptoms generally appear on the third or fourth day.

The pulse rate generally rises before the temperature

rises ; but, in puerperal fever, pulse and temperature are closely related to one another and should be considered together.

A rise of temperature soon follows the increase in the pulse rate in most cases. Thus if the pulse is over 100 per minute and the temperature then rises over 100° F. there is good cause for alarm. If the temperature rises without the pulse, or if a quick pulse continues for some hours without any rise in temperature, some cause of disturbance other than infection will probably be found to exist.

The most definite sign of infection is the occurrence of **a shivering fit** or **rigor**, with the rise of pulse rate and temperature. The patient complains of feeling chilly, perhaps of intense cold. She then may have a violent attack of shivering, her teeth chattering and her body trembling so as to shake the bed. The temperature rises suddenly and as the rigor passes away the patient becomes intensely hot. Profuse perspiration often follows. In many cases of infection attacks of this kind are repeated at irregular intervals, but rigors do not occur in all cases. Thus the absence of rigors means nothing, but the occurrence of one or more, together with a rise in pulse rate and temperature, may be taken as conclusive evidence that infection has occurred. A chilly feeling and slight shivering just after labour is over is quite common and must not be mistaken for a rigor.

In many of the worst cases there is **no change in the lochial discharge.** In other cases it stops altogether or is much lessened. It is often stated that in puerperal fever the lochial discharge has a foul or putrid smell. This is only true of a certain number of cases, and it must be said that as a rule these are, at first, less serious cases than those in which the lochia remains sweet.

Foul discharges are caused, as a rule, by the putre-

faction of some portion of the placenta or membranes which has been left in the uterus. Decomposition of these masses, with the blood clot which surrounds them, causes a free flow of stinking discharge and the patient has fever. But when the uterus has been carefully cleaned out and every scrap of decomposing matter has been removed, the patient generally recovers quickly. For, in these cases, the bacteria themselves may remain in the uterus, while only the poisons they form are absorbed into the blood. When the uterus is emptied and disinfected recovery occurs. But if the germs themselves have passed from the uterus into the patient's blood, cases of this class are as serious and dangerous as any others.

The **uterus** may remain **large, soft and flabby** in puerperal fever—as all feverish conditions tend to delay the process of involution. In some cases this is not noticed, while in others it is important, as it may cause the lochial discharge to continue longer and to be more profuse than usual.

In puerperal fever, just as in all fevers, the **breathing** is quicker than usual. The common rate is 16 breaths in a minute, but feverish patients often breathe 36 or even 48 times a minute. The rate of respiration may well be recorded on the chart, like the pulse and temperature.

Pain may be **entirely absent.** In many of the worst cases the patient complains of nothing and says she feels specially well until she begins to be exhausted by the continuance of the fever. These patients, intoxicated by the poisons produced by bacteria, are as cheerful as some persons are at a certain stage of intoxication by alcoholic drinks. More often patients complain of headache, and sometimes there is pain and tenderness in the lower part of the abdomen. Very rarely

there is general abdominal swelling, tenderness and pain.

The descriptions often given of patients as pale, wan and anxious, with haggard faces and other manifestations of illness, refer to the later stages of the disease. These descriptions are very misleading. It is most important to remember that the existence of infection must be discovered as early as possible, when in all probability the patient still looks and feels perfectly well.

For the same reason the vomiting, diarrhœa and delirium which may occur later are of no importance as signs of infection. The disease must be discovered long before they appear.

It must be borne in mind that all fever during the puerperium is not of necessity "puerperal fever." It is possible for a lying-in patient to have other fevers, such as influenza, typhoid fever, pneumonia and the like. Again, septic infection of one of the breasts will cause the symptoms of blood-poisoning, but this should be easily recognised by the swelling, pain, and tenderness of the breast. A certain amount of rise in pulse rate and temperature may be caused by mere distension of the breasts before the flow of milk is properly established. This disturbance is slight and quickly passes away. In some patients a visit from a friend or any other cause of mental excitement is enough to quicken the pulse for a time and even to raise the temperature slightly. But the commonest of all causes of slight fever during the lying-in time is want of proper attention to the bowels. If the patient has been constipated before her confinement, the enema given during labour will only remove a small portion of the fæcal masses in her bowels. These remain where they were until the aperient is given, and this again only removes a small portion of the contents of the large intestine. Even if the bowels are moved every day thereafter, still

there is always a quantity of decomposing fæcal matter in the bowel. Under these circumstances the pulse and temperature rise because poisonous material is absorbed from the bowel. The patient may complain of headache, and she is often troubled with flatulent distension of the abdomen, and with griping pains. A large dose of castor oil generally works like a charm in removing these symptoms. As an alternative, calomel (3 grains) may be given in the evening, and followed by a saline in the morning. Repeated large enemata of soap and water, with a tablespoonful of turpentine to each pint, will help to remove collections of fæces from the bowel.

It is not safe to refrain from securing the help of a medical man until it becomes certain that septic infection has occurred. The midwife should, therefore, act strictly according to her regulations and should send for help whenever there is a rise of temperature above 100.4° F. with quickening of the pulse for more than 24 hours. She should also have assistance if the lochial discharge smells at all foul, if a rigor occurs, or if any abdominal swelling is noticed.

White Leg

(*Phlegmasia alba dolens*)

This condition is really a result of septic infection. It shows itself, as a rule, about two weeks after labour. The patient complains of pain in one leg, which soon begins to swell and quickly becomes much enlarged and quite useless. The other leg is generally affected in the same way a little later, though the trouble sometimes begins in both at the same time. In some cases the legs are extremely smooth, white and glistening, and are so firm that the finger can hardly be pressed into them. In other cases the swelling is not so hard, and

pits deeply on pressure, while the colour of the skin is less white.

Cases of phlegmasia require very careful nursing. The foot of the bed should be slightly raised, and the leg should be carefully padded with a large quantity of cotton wool and then bandaged. The pain, which at first is very severe, must be relieved according to the instructions of a medical man. Long after the pain has gone the swelling remains. Six, eight or ten weeks may pass before the patient can be out of bed, and, during the daytime, the legs should be bandaged from the foot upwards for months.

Inflammation of the Breasts

(*Mastitis*)

It has been mentioned above that pain and tenderness of the breasts often demand attention before the flow of milk has become regular. The hard knots or lumps which form in the breast must be rubbed away gently with a warm oiled hand, the movements being made always towards the nipple, so as to urge the milk in the proper direction. Now this kind of trouble is not inflammation of the breast, but it needs only one thing to turn it into true inflammation, namely, **the presence of germs within the breast**, either in the tubes through which the milk flows, or in the mass of the breast outside the milk tubes.

Bacteria can get into the breast either by passing into the openings of the milk tubes on the nipple, or by means of cracks in the skin of the nipple and round its base.

Thus the cause of inflammation of the breast is **infection** through **dirty nipples** and through **sore** or **cracked nipples**.

To prevent infection and inflammation of the breast it is therefore necessary to attend to the nipples as previously described (see pages 40, 148).

Cracks in the skin of the nipple are extremely painful, and sometimes patients have to give up nursing because the cracks will not heal while the breasts are still in use. These cracks are much more easily prevented than cured. Sometimes the use of a nipple shield allows them to heal.

Inflammation of the breast causes great pain and discomfort. Some portion of the breast becomes very hard and tender, and there is swelling of the whole breast. There is fever, as is shown by rapid pulse and raised temperature; and the patient is generally unable to sleep on account of the pain. The condition may either subside under treatment, or it may go on to end in **abscess formation**. Redness of the skin over the inflamed part of the breast with softening in the centre of the hard mass are the signs that suppuration has occurred, and that there is an abscess, which must be opened in order to save the patient prolonged suffering while waiting until it bursts. Medical assistance should be secured when the first signs of inflammation appear. Rubbing is useless in real inflammation, though it is the proper treatment for simple swelling with knots and lumps. The inflamed breast should be supported by bandages or by the dress in a manner which gives firm but not painful pressure. Hot fomentations may be freely used. They cannot cause suppuration, but they favour its progress when it is unavoidable and so hasten the end of the trouble.

The patient should not have much drink or fluid food and her bowels should be kept loose, these being two ways of reducing the flow of milk.

Disorders of the Bladder

It has been mentioned that there is occasionally some difficulty in passing water after labour, and also that patients sometimes lose control over the neck of the bladder, so that the urine dribbles away for a time. It must also be remembered that on very rare occasions the bladder is injured during labour, so that the urine flows continuously through a tear in the wall of the bladder from the end of labour onwards. More frequently, when crushed and bruised by long continued pressure of the head in a delayed labour, a portion of the bladder wall dies and forms a "slough." The slough separates and comes away several days later leaving a communication between the bladder and the vagina. In these cases the water begins to run away only after the separation of the slough.

Inflammation of the bladder or *cystitis* is seldom seen during the lying-in period except in cases in which the catheter has been used. It is caused by infection of the inside of the bladder by germs of the same kinds which cause puerperal fever and inflammation of the breasts. Its signs are pain and constant desire to pass water. The urine contains pus or "matter" like that from an abscess, which forms a sediment after the urine has been left standing for a time.

Secondary Post-Partum Hæmorrhage

Bleeding from the uterus during the lying-in period is called secondary hæmorrhage. It may occur at any time and may be so profuse as to cause alarm. It is almost always caused by a piece of placenta left in the uterus. When bleeding of this kind occurs it is always necessary to have the uterine cavity examined and carefully emptied, so that any sudden increase of the lochial discharge while

it is still red, or any flow of blood after it has become pale in colour, should be the signal for securing assistance.

Mental Disease during the Puerperium

It has been mentioned that patients sometimes become mentally affected during pregnancy. The same conditions are seen during the lying-in period and sometimes much later during lactation. The patient may become very depressed, refusing food, refusing to speak, and unable to sleep. This quiet form of the condition is called *melancholia*. In other cases there is excitement and violence, and the condition is named *mania* or madness.

ABNORMALITIES IN THE CHILD

Injuries received during Labour

The caput succedaneum or swelling which forms over the presenting part during labour has been described, as has the alteration of the shape of the head caused by head moulding. It was stated that these results of labour pass away in a few days (see pages 93, 195).

Sometimes swellings of a different kind are seen. There may be one, two, three or more of these, and they have a peculiarity by which they can be recognised. Each swelling lies exactly over one of the bones of the head, and does not extend beyond that bone. There may be one over each parietal and one over each frontal bone, but they never extend across the fontanelles and sutures which separate the bones. The swelling consists of blood poured out between the bone and the membrane covering the bone, which might be called the skin of the bone. At the sutures this membrane is bound firmly down, and cannot be raised by the escaping blood. So the size of the swelling is limited by that of the bone. These swellings are very slow in disappearing. They require no treatment. The duty of the midwife or nurse is to assure the mother that all will be well with patience, and to protect the swelling from injury. If bruised or rubbed these swellings sometimes suppurate, and they then have to be opened and treated as abscesses. A swelling of this kind is called a *Cephalhæmatoma*.

Occasionally bones of the skull are broken and sometimes there is bleeding within the head. Injuries of this

kind are generally fatal. If not they may cause paralysis. In rare cases something may be done for the child by surgical interference.

Certain nerves which supply the head and face may be injured so that the child's face is more or less paralysed on one side. Thus one eye many remain open because the child is unable to close it, and it may be noted that crying, smiling, and all movements are confined to one side of the face. Facial paralysis generally passes off quickly.

In other cases some of the nerves supplying one arm may be injured in the neck region causing paralysis of the limb. This injury may be caused while bringing down the arms in a difficult breech case, or while doing artificial respiration by Schultze's method. Recovery is generally complete, but the arm is sometimes feeble for many months, and in rare cases the paralysis is permanent.

Limbs are sometimes broken during labour, and a part which differs in shape from the corresponding part on the other side of the body should be examined by a medical man especially if there is tenderness on pressure.

Deformities and Malformations

There are some malformations which make it impossible for the child to live after birth, while others may permit of continued life. Some of these can be corrected by surgical interference. Any deformity or peculiarity which can be seen should be reported to a medical man without delay. Sometimes the anus is imperfectly formed and there is no communication with the bowel. In other cases the water passage is not open. Either of these malformations must be corrected, if possible, without any loss of time.

Some deformities, such as hare-lip and cleft palate, make it impossible for the child to suck. In these cases the milk should be drawn from the breasts with a pump

and given to the child with a spoon or a pipette like those used for filling fountain pens.

Other malformations cannot be discovered by external examination. Some of these are in the heart, and are shown to exist by the blue colour of the skin, coldness of the limbs and imperfect breathing. In other cases the child cannot suck. Sometimes milk enters the stomach and cannot pass on into the bowels, but is vomited. When any concealed peculiarity is suspected to exist a medical man should be asked to see the child.

Prematurity

Children born before the 28th week of pregnancy generally die in a few hours; indeed few of those born before the 32nd week are reared. These weigh about three pounds and are dark in colour, as the red of the blood shows through the skin much more than it does at term. There is much less fat under the skin, which is thus loose and wrinkled. When the 36th week has been reached the child may weigh between four and five pounds, and has a fair chance of life. Growth in weight is rapid during the last month, for at the 40th week most children weigh between seven and eight pounds. It is thus clear that, even during the last month, every week is of importance.

Apart from the red colour, small size and light weight of premature children, their imperfect finger and toe nails and their wide fontanelles and sutures attract attention. Their skins also are covered with fine down called *lanugo*, which is not seen on most children because it disappears before full term.

Infants which are easily seen to be premature should not be washed or dressed, but should be rubbed all over with cod liver oil or some other greasy substance. This helps the imperfectly formed skin to protect the child, which should then be wrapped in cotton wool and put in

a flannel lined basket or baby's bath, which is kept warm by means of hot water bottles. In hospitals "incubators" are used in which premature children are kept at a uniform temperature of about 95° F. during the first week or two. Some of the newer incubators are warmed by gas flames regulated by an automatic regulator; but others are simply boxes with glass lids, ventilated by holes and kept warm by hot water bottles placed under a shelf or false bottom on which the child lies. If a medical man arranges to bring on premature labour artificially, an incubator can be provided beforehand: but it is difficult to obtain one when it is wanted suddenly.

Premature children must be fed oftener than every two hours. They cannot suck for themselves, so the mother's milk should be drawn off with a pump and given to the child with a teaspoon or a pipette, about two teaspoons every hour at first and, later, larger quantities at longer intervals.

Diseases of the New-Born

Ophthalmia.—It has been mentioned that the child's eyes require especial attention, both at and after birth, and that, in cases where the mother has any vaginal discharge, a few drops of mercurial lotion (1 in 1000) should be dropped between the eyelids.[1] This is done in order to kill any of the germs of the disease called gonorrhœa which may have entered the eyes during labour. The disease called ophthalmia of the new born quickly shows itself as an inflammation of the insides of the eyelids, and of the covering of the eyeball. The eyes are kept shut, and a discharge of pus collects within them. If the eyelids are held apart, the pus runs out, and the eyeball is seen to be dull like ground glass, instead of clear. The treatment should be directed by a specialist in diseases of the

[1] Medical men generally use a solution of nitrate of silver (2 grains in an ounce of water) for this purpose.

eye, whose help should be secured as soon as redness and swelling of the eyelids is noticed. The result is blindness, unless treatment is begun early and carried out with the utmost care.

Syphilis.—It has been mentioned that syphilis often causes abortion, and also causes the death of the child before birth. In syphilitic children which are born alive, the signs of the disease commonly appear a month or six weeks after birth. Sometimes within a few days of birth the disease can be recognised by the state of the skin round the anus and private parts, on the feet, especially the heels, and at the corners of the mouth. Running at the nose, or snuffles, is often the first symptom to attract attention in syphilitic children.

Infection of the Umbilicus.—Inflammation round the navel may begin before the cord has separated, but it usually occurs at the raw surface left when the cord drops off. A greyish skin forms over the scar, and the skin round it is reddened. The child has fever, as a result of the infection. The infection may travel by way of the blood-vessels into the child's body, causing blood-poisoning (or septicæmia) which is almost always fatal.

Icterus: Jaundice.—It has been mentioned that the skin of the new-born child often turns yellow, especially over the face and the chest. In most cases, the whites of the eyes are not affected, and the child's urine and the motions of the bowels are not altered in colour. The yellow tinge passes off in a few days.

In a few cases the whole skin is very much discoloured, the whites of the eyes are yellow, the motions are darker in colour, being brown instead of the usual yellow, and the child's water stains the napkins a rich yellow or light brown colour. These rare cases are very serious, and usually end fatally. The condition is called malignant jaundice.

Hæmorrhage into the Bowel.—Sometimes the motions are dark like tar in appearance. This is due to bleeding into the stomach and bowels. The child may vomit blood which may be red, or more or less altered. The child shows the usual signs of hæmorrhage — pallor, weakness and rapid pulse—and frequently dies in spite of treatment.

Duties as regards Diseases of the New-Born.—The midwife is not supposed to understand or to treat the diseases of infancy. She is only expected to know "the signs of the diseases which may develop during the first ten days." When the child is ill, it is the midwife's duty to advise the parents to obtain medical advice.

FINIS

APPENDIX

Extracts from the Rules framed by the Central Midwives Board

The examination of the Central Midwives Board embraces the following subjects:—

(*a*) The elementary anatomy of the female pelvis and generative organs.

(*b*) Pregnancy and its principal complications, including abortion.

(*c*) The symptoms, mechanism, course, and management of natural labour.

(*d*) The signs that a labour is abnormal.

(*e*) Hæmorrhage: its varieties and the treatment of each.

(*f*) Antiseptics in midwifery and the way to prepare and use them.

(*g*) The management of the puerperal patient, including the use of the clinical thermometer and of the catheter, and the taking of the pulse.

(*h*) The management (including the feeding) of infants, and the signs of the diseases which may develop during the first ten days.

(*i*) The duties of the midwife as described in the Regulations.

(*j*) Obstetric emergencies, and how the midwife should deal with them until the arrival of a doctor. This will include some knowledge of the drugs commonly needed in such cases, and of the mode of their administration.

(*k*) Puerperal fevers, their nature, causes, and symptoms.

(*l*) Some knowledge of the local manifestations of venereal disease in its effects on the newly born.

(*m*) The disinfection of person, clothing, and appliances.

(*n*) The principles of hygiene as regards the home, food supply, and person

(*o*) The care of children born apparently lifeless.

Directions to Midwives concerning their Person, Instruments, etc.; their Duties to Patient and Child; and their Obligations with Regard to Disinfection, Medical Assistance, and Notification

Note.—When engaged to attend a labour the midwife should take an opportunity of visiting the patient in her own house to advise as to personal and general arrangements for the confinement.

1. The midwife must be scrupulously clean in every way, including her person, clothing, appliances, and house; she must keep her nails cut short, and preserve the skin of her hands as far as possible from cracks and abrasions.*

* *Note.*—Unless the cleansing process be thoroughly carried out there will be, even after a healthy confinement, remains of blood, lochia, or liquor amnii on the fingers, and especially under the nails, which will there undergo decomposition, and so become dangerous to the next patient attended.

When attending to her patients she must wear a clean dress of washable material that can be boiled, such as linen, cotton, etc., and over it a clean washable apron or overall.

The sleeves of the dress must be made so that the midwife can tuck them up well above the elbows.

For list of appliances see Rule 2.

2. When called to a confinement the midwife must take with her in a bag or basket furnished with a removable lining which can be disinfected:—

(*a*) An appliance for giving vaginal injections, a different appliance for giving enemata, a catheter, a pair of scissors, a clinical thermometer, and a nail-brush.

The Local Supervising Authority may, in the case of untrained midwives, use its discretion with regard to insisting upon the carrying of a catheter and appliances for giving vaginal injections.

(*b*) An efficient antiseptic or efficient antiseptics for such purposes as

(1) Disinfecting the hands.
(2) Douching in special cases.
(3) Cleansing the infant's eyelids.

3. Before touching the generative organs or their neighbourhood the midwife must on each occasion disinfect her hands and forearms.

4. All instruments and other appliances must be disinfected, preferably by boiling, before being brought into contact with the patient's generative organs.

5. Whenever a midwife has been in attendance, whether as a midwife or as a nurse, upon a patient, or in contact with a person, suffering from puerperal fevers or from any other condition supposed to be infectious, or is herself liable to be a source of infection, she must disinfect herself and all her instruments and other appliances, and must have her clothing thoroughly disinfected, to the satisfaction of the Local Supervising Authority, before going to any other maternity patient. (See Rule 17.)

Unless otherwise directed by the Local Supervising Authority, all washable clothing must be boiled, and other clothing must be sent to be disinfected by the Local Sanitary Authority.

Duties to Patient

6. A midwife in charge of a case of labour must not leave the patient without giving an address by which she can be found without delay; and after the commencement of the second stage she must stay with the woman until the expulsion of the placenta, and as long after as may be necessary. In cases where a doctor has been sent for on account of the labour being abnormal or of there being threatened danger (see Rule 19), she must await his arrival and faithfully carry out his instructions.

7. The midwife must wash the patient's external parts with soap and water, and then swab them with an efficient antiseptic solution on the following occasions:

(*a*) Before making the first internal examination;
(*b*) After the termination of labour;
(*c*) During the lying-in period, when washing is required;
(*d*) Before passing a catheter.

For this purpose the midwife must on no account use ordinary sponges or flannels, but material which has been boiled or otherwise disinfected before use.

8. No more internal examinations should be made than are absolutely necessary.

9. The midwife in charge must in all cases of labour examine the placenta and membranes before they are destroyed, and must satisfy herself that they are completely removed.

10. The midwife must remove soiled linen, blood, fæces, urine, and the placenta from the neighbourhood of the patient and from the lying-in room as soon as possible after the labour, and in every case before she leaves the patient's house.

11. The midwife shall be responsible for the cleanliness, and shall give all necessary directions for securing the comfort and proper dieting, of the mother and child during the lying-in period, which shall be held, for the purpose of these Regulations and in a normal case, to mean the time occupied by the labour and a period of ten days thereafter. (See Rule 20.)

Should the midwife for any reason continue her attendance after the tenth day the fact must be noted in her register, with the explanation of the reason.

12. A case of normal labour in these regulations shall mean a labour in which there are none of the conditions specified in Rule 20 below.

13. The midwife shall take and record the pulse and temperature of the patient at each visit.

Duties to Child

14. In the case of a child being born apparently dead, the midwife must carry out the methods of resuscitation which have been taught her.

15. As soon as the child's head is born, and if possible before the eyes are opened, its eyelids must be carefully cleansed.

*16. On the birth of a child which is in danger of death, the midwife shall inform one of the parents of the child's condition.

* It is highly desirable that the midwife should see that every birth occurring in her practice is notified to the Local Supervising Authority within 48 hours, together with the name and address of the parent.

General

17. No midwife shall (except under the circumstances hereinafter mentioned) undertake the duty of laying out the dead.

In no case must a midwife lay out the body of any patient on whom she has not been in attendance at the time of death, or a body upon which a post-mortem examination has been made.

A midwife shall not transgress this rule if—

(*a*) She prepares for burial the body of a lying-in woman, a still-born child, or an infant dying within ten days; or if—

(*b*) She lays out a dead body in a case of non-infectious illness, provided that she is not prohibited from doing so by any general rule of the Local Supervising Authority, and is not attending a midwifery case at the time.

After laying out a dead body for burial she must notify the Local Supervising Authority and undergo adequate cleansing and disinfection in accordance with Rule 5.

18. A midwife must note in her Register of Cases each occasion on which she is under the necessity of administering any drug other than a simple aperient, the dose, and the time and cause of its administration.

Conditions in which Medical Help must be Sent for

19. In all cases of abortion, of illness of the patient or child, or of any abnormality occurring during pregnancy, labour, or lying-in, a midwife must explain that the case is one in which the attendance of a registered medical practitioner is required, and must hand to the husband or the nearest relative or friend present the form of sending for medical help, properly filled up and signed by her, in order that this may be immediately forwarded to the medical practitioner. If for any reason the services of a registered medical practitioner be not available, the midwife must, if the case be one of emergency, remain with the patient and do her best for her until the emergency is over.

After having complied with the rule as to the summoning of medical assistance, the midwife will not incur any legal liability by remaining on duty and doing her best for her patient.

20. The foregoing rule shall apply:—

(1) In all cases in which a woman during Pregnancy, Labour, or Lying-in appears to be dying or is dead.

PREGNANCY.

(2) In the case of a PREGNANT woman—

(*a*) If the patient is a dwarf or deformed;

(*b*) When there is loss of blood;

(*c*) When there is any abnormality or complication, such as—

Excessive sickness.
Puffiness of hands or face.
Fits or convulsions.
Dangerous varicose veins.
Purulent discharge.
Sores of the genitals.

LABOUR.

(3) In the case of a woman in LABOUR at or near term, when there is any abnormality or complication, such as—

Fits or convulsions.
A purulent discharge.
Sores of the genitals.
A malpresentation.
Presentation other than the uncomplicated head or breech.
Where no presentation can be made out.
Where there is excessive bleeding.
Where two hours after the birth of the child the placenta and membranes have not been completely expelled.
In cases of serious rupture of the perinæum, or of other injuries of the soft parts.

LYING-IN.

(4) In the case of a LYING-IN woman, when there is any abnormality or complication, such as—

Fits or convulsions.
Abdominal swelling and tenderness.
Offensive lochia, if persistent.
Rigor, with raised temperature.
Rise of temperature above 100·4° F., with quickening of the pulse for more than twenty-four hours.

Unusual swelling of the breasts with local tenderness or pain.
Secondary post-partum hæmorrhage.
White leg.

THE CHILD.

(5) In the case of the CHILD, when there is any abnormality or complication, such as—
Injuries received during birth.
Any malformation or deformity in a child that seems likely to live.
Dangerous feebleness.
Inflammation of, or discharge from, the eyes, however slight.
Serious skin eruptions.
Inflammation about the navel.

NOTIFICATION TO THE LOCAL SUPERVISING AUTHORITY

21. (1) The midwife must, as soon as possible, send notice on the prescribed form to the Local Supervising Authority in the following cases:—

(*a*) *Medical help.*—Whenever under Rule 19 the advice of a registered medical practitioner has been sought.

(*b*) *Deaths.*—In all cases in which the death of the mother or of the child occurs before the attendance of a registered medical practitioner.

(*c*) *Stillbirths.*—In all cases of stillbirth where a registered medical practitioner is not in attendance at the time of birth.

Note.—A child is deemed to be stillborn when after being completely born it has not breathed or shown any sign of life. (See Rule 14.)

(*d*) *Laying out the dead.*—In all cases in which she has prepared, or assisted to prepare, a dead body for burial. (See Rule 17.)

(2) *Change of name or address.*—The midwife must immediately notify the Local Supervising Authority of any change of her name or address.

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